COMPUTERWORLD

OA

OFFICE AUTOMATION

VOL. 8 NO. 24
JUNE 23 1980

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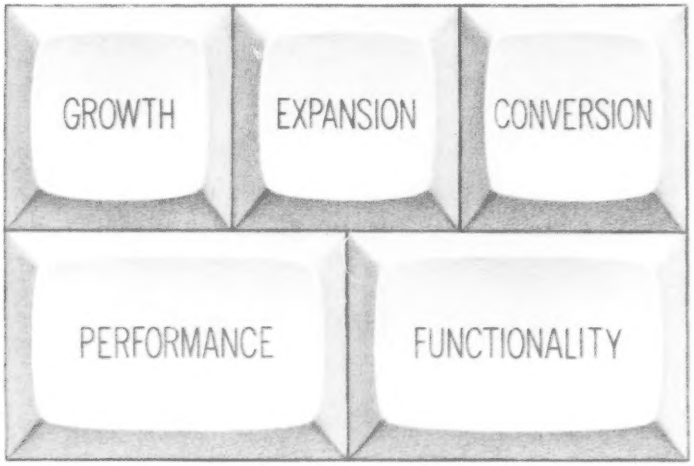

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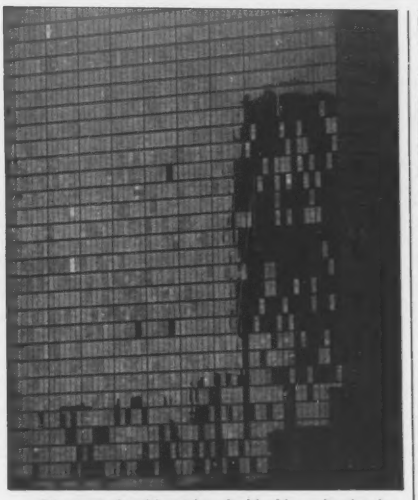
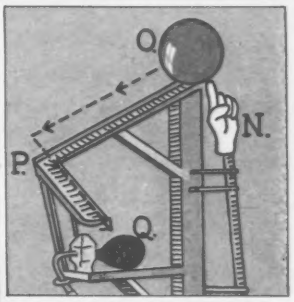


OA users should not be afraid of learning by doing. Now beautiful, this Boston skyscraper once had hundreds of plywood boards covering its windows after they began to pop out unexpectedly. The photograph was taken by Lou Jones, a Boston-based photographer.



COMPUTERWORLD

OA

CW COMMUNICATIONS/INC.
Box 880, 375 Cochituate Road,
Framingham, Mass. 01701

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Second-class postage paid at Framingham, Mass., and additional mailing offices PN127420. *Computerworld* (ISSN-0010-4841) is published weekly, except: March (7 issues), June (5 issues), September (6 issues), October (5 issues), December (4 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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Computerworld subscription prices: $1.25 a copy; U.S. — $36 a year; Canada, Central & So. America — $65 a year; Europe and Near East — $125 a year; other foreign — $175 a year (airmail service). *Computerworld OA* single copy price: $5.00. Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

Computerworld can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zebb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed; write to Circulation Dept. for subscription information.

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POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., Box 880, 375 Cochituate Road, Framingham, MA 01701.

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NEWSBRIEFS

MENLO PARK, CALIF. — THE NUMBER OF AUTOMATED WORKSTATIONS WILL SURPASS THE EXISTING NUMBER OF ELECTRIC TYPEWRITERS BY THE END OF THE DECADE, with one out of every four white-collar workers having one, according to SRI International.

Terminals, in the form of word processors, data processors or some combination of the two, will increase from the current 1.5 million units to more than 17.5 million by 1990, SRI said.

The research firm also predicted that by 1990 the time savings from office automation will be substantial. As new technology is implemented, sales workers will save up to 13% of time spent annually on office-related chores, managers up to 14%, professionals up to 25% and clerical staff up to 36%. SRI's findings are based on a data base from over 6,000 interviews with 3,000 U.S. organizations.

SRI's Office Automation Consulting and Research Programs can be reached at 333 Ravenswood Ave., Menlo Park, Calif. 94025.

RIDGEFIELD, CONN. — THE SOCIETY OF OFFICE PROFESSIONALS (SOAP) HAS BEEN ORGANIZED and incorporated as a nonprofit organization. Soap hopes to provide an integrated perspective on OA and has identified four specific goals: promoting OA as a profession; encouraging standards of professional excellence; facilitating communications throughout the international community; and promoting relevant research, standards and public policy.

N. Dean Meyer was elected president; members of the board represent different segments of the OA field. Addi-

NEWSBRIEFS

tional information is available from Meyer at 233 Mountain Road, Ridgefield, Conn. 06877

ATLANTA — THE IEEE 802 COMMITTEE IS ONE STEP CLOSER TO AGREEING ON A LOCAL-AREA NETWORK STANDARD based on three separate kinds of access methods and media. Called "nearly complete" by one committee member, the proposals are expected to undergo further fine-tuning in an upcoming August meeting. Logical link control is common to all three access methods — carrier-sense multiple access with collision detection (CSMA/CD), a baseband signaling technique, a token-passing ring scheme using triaxial or twisted-pair cable and a token-passing bus scheme, which is a broadband technique using standard CATV coaxial cable.

NEW ERGONOMIC CONCERNS HAVE SURFACED surrounding recent accounts of several dozen CRT terminal operators who have developed face rashes, according to reports from Norway, the UK and Canada. Norwegian researchers have speculated the problem may be the result of an electrical reaction involving the CRT screens, workers and air pollutants; they urged operators to use face creams. U.S. officials reject the theory, however, and theorize the problem is caused by dry air.

REGARDING VISUAL HAZARDS FROM USING CRT TERMINALS, THE NEWSPAPER GUILD HAS BEGUN A SIX-CITY STUDY OF CRT USE. Study results will not be determined for some time. Twenty-four guild contracts now require employers to pay for regular eye exams for CRT terminal operators and 10 require rest breaks.

BOSTON — ON THE SAME SUBJECT, A BILL HAS BEEN SUBMITTED TO THE MASSACHUSETTS STATE LEGISLATURE by the Boston Edison Clerical Workers Union, aimed at protecting users from possible health hazards associated with CRT usage.

Believed to be only the second of its kind ever proposed in the U.S., the bill is asking that employers be required to give advance notice to employees who might use terminals, to offer extensive preuse eye examinations, to make ergonomic evaluations, to install lighting and desk equipment that would alleviate health hazards and to provide structured work breaks.

The first bill of this kind was introduced in the Maine legislature last year, but this is thought to be the first proposed by a union.

SUNNYVALE, CALIF. — LOCKHEED MISSILES AND SPACE CO., A COMPANY IN THE FOREFRONT OF SPACE AGE AND COMPUTER TECHNOLOGY, HAS APPARENTLY BYPASSED ELECTRONIC MAIL, teleconferencing or other automated methods in favor of an even (newer?) and more efficient kind of technology.

The company is using pigeons to relay microfilmed computer data, which is strapped on the birds' legs, from its Sunnyvale headquarters to its Santa Cruz, Calif., research station.

The winged messengers can cover the 25-mile distance in approximately 30 to 40 minutes. The carrier service, which works for bird feed, has proven faster than interoffice mail or human courier services.

Since pigeons apparently navigate using the position of the sun and visual landmarks, Lockheed does not use them in bad weather. When a storm blew up suddenly during one run, one pigeon was detained for three hours and a second bird failed to return for three days.

WILLOW GROVE, PA.— OFFICE EMPLOYEE TURNOVER IS DOWN 3% during the past two years, amounting to an average turnover rate of 17%, according to Administrative Management Society (AMS). Unlike the rest of the country as a whole, the western section of the U.S. has seen a 4% increase in employee turnover during the same two years. A copy of the survey costs $15 from AMS, 2360 Maryland Road, Willow Grove, Pa. 19090.

WILLOW GROVE, PA. — THE INTERNATIONAL INFORMATION/WORD PROCESSING ASSOCIATION (IWP) STARTED A NATION-WIDE TELEPHONE JOB-LINE service May 1 for its members and the information processing industry.

Employers can advertise information and management/supervisory positions on an answering machine for $20 a month. IWP's more than 14,500 members can call and listen to a recorded list of all current openings. To apply, a caller sends a resume to Job-Line, c/o IWP, 1015 N. York Road, Willow Grove, Pa. 19090, giving the job code number listed on the tape. Resumes will then be forwarded to advertisers.

WASHINGTON, D.C. — ALTHOUGH THE JUSTICE DEPARTMENT WAS TOLD IT WAITED TOO LONG TO SUE THE U.S. POSTAL SERVICE ON THE PREMISE THAT ITS NEW ELECTRONIC MAIL SYSTEM CREATES UNFAIR COMPETITION WITH PRIVATE COMPANIES, the Electronic Computer-Originated Mail (Ecom) may fall into the dead letter department all on its own.

The anticipated high-volume mailers expected to take advantage of Ecom have so far failed to materialize. Instead of the estimated 400,000 messages per week, the highest total to date was 15,000.

NEW YORK — THE TELECOM LIBRARY HAS PUBLISHED THE *GUIDE TO KEY SYSTEMS AND MINI-PBXs*, which tells how to acquire a telephone system that will work for up to 100 people. The book costs $75 from the publisher at 205 W. 19 St., New York, N.Y. 10011.

NEW YORK — THE U.S. LOCAL-AREA NETWORK MARKET WILL DOUBLE from its present $6 million shipment level to $15 million. The market is also expected to double each year, to top $1 billion by 1990. The figures are based on a report by Frost & Sullivan, a market research firm, which also noted that broadband-based networks with the capability of video and voice will keep up with the developing technologies.

Prop up this magazine against your IN Box and you'll get a good idea of how the new HP 2382 office display terminal would look on your desk. It's that small!

It's got a price to match.

At only $1700, the HP 2382 provides an affordable and personal "information window" for people in many different departments. They'll be able to see at a glance the information they need for responsible decision making. Whenever they need it.

It's very fitting.

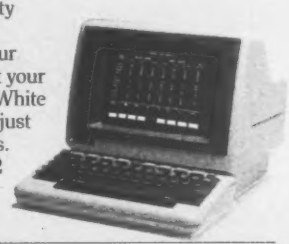
The 2382 is really a full-capability terminal—with "big terminal" features like screen-labeled soft keys, block mode and local editing. But its compact and pleasing design makes it as easy to accommodate on the office desk as the telephone. And it's almost as easy to use.

The detached typewriter-style keyboard has a coiled cord that won't interfere with the desktop work area. And the keys have a sculptured profile and a velvet finish for a friendlier feel. There's even a deep-dish touch on the "F" and "J" keys for easy location of the "home row."

The HP 2382 works with computers from most major manufacturers. But no matter what system you use it with, it's backed by HP's worldwide service organization. *And* our reputation for high-quality products.

Prop up this magazine on your manager's desk, too. Then contact your local HP sales office listed in the White Pages to size up the situation. Or just return the coupon for more details.

You can size up the HP 2382 at Productivity '82. Watch your newspaper for more details.



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Keyboard reproduced actual size (11" wide). CRT appears slightly smaller because of photographic perspective.

LETTERS

Battles Lost

I would like to offer some observations on the first issue of your new *Computerworld OA* publication.

We lost the war in Viet Nam because we thought sophisticated technologies were more important than people. And while our attention and resources were wasted in that far-off land, we lost the battle for quality and productivity on the shop floor.

We now seemed doomed to repeat our past failures in our offices. Only one article in your entire issue really talked about people. This is very disappointing.

The excellent piece by Mary A. Karon, "When It Doesn't Work," illustrated some important points:

1) Even in relatively simple conversion efforts (such as replacing typewriters with word processors), conversion will probably be difficult.

2) Morale is more important than technology.

3) Incremental change is almost always preferable to rapid conversion.

4) Successful conversion must be based upon respect for workers and extended consultations among all concerned parties.

I suggest that these simple truisms are rarely recognized by our managers and that is one reason why the Japanese are taking over.

The structure of today's offices evolved over a period of more than a century. It represents a moderately successful accommodation to human, managerial and technological constraints. Unless we move slowly and carefully, the "office of the future" will be a very frustrating, expensive and disappointing institution.

We may be able to increase productivity on the shop floor by replacing people with robots, but the adaptation of technology to our offices will require a more sophisticated understanding of human organization.

Robert I. Rhodes, Ph.D.
Monsey, N.Y.

To Our Readers

This marks the second issue of *Computerworld OA*, *Computerworld*'s quarterly publication that examines the developing office automation marketplace. Current CW subscribers will continue to receive the publication this year as part of their subscription. Other readers who want to continue receiving *Computerworld OA* should subscribe to *Computerworld*, using the bound-in envelope and subscription form located elsewhere in this issue.

We encourage readers to let us know their opinions, suggestions, problems and news of technological breakthroughs.

Not a Kvetch!

May I congratulate and thank you for the excellent articles by Richard Koffler and Marvin Dainoff ["Ergonomics: The Mental Strain; The Physical Pain," *Computerworld OA*, March 31]. They are by far the best of many articles I have read on this very important subject. I think the authors must have been reading my mind or, at the very least, looking over my shoulder during the long, painful period I have just undergone in learning to cope with a word processor.

My employers — three very bright computer wizards — purchased a WP system a little over a year ago after investigating numerous brands and sitting through several sales pitches and "hands-on" demonstrations (invariably conducted by hot-shot sales reps whose fingers moved at blinding speeds — almost as fast as their tongues spouted jargon and superlatives describing their respective products). Meanwhile, I, a mere clerical cretin when it comes to mastering anything more mechanically sophisticated than the buttons on my Touch-Tone phone, sat in on these demonstrations and was assured the three half-day training sessions would be ample to get me started in the wonderful time- and effort-saving world of WP.

But, as I watched the flicker of little blue letters through the reflected glare of the overhead fluorescents and winced at the staccato rattle of the high-speed printer that I knew would be sitting at my elbow eight hours a day, I expressed a certain apprehension to my superiors. My lack of enthusiasm was met with condescension and a bit of eye-rolling by these well-educated gentlemen almost young enough to be my sons. I think they were wrestling with the cost-effectiveness of putting this old broad out to pasture and hiring one of the young hot-shot clones who would be less resistent and more easily trainable (user-acceptive?).

The twenty-odd-thousand-dollar system was purchased and I somehow survived the next several difficult months of learning to be a "word processor." During this period, however, I started wearing glasses for the first time in my life, suffered a string of psychosomatic illnesses and became a frequent visitor to the respective offices of my friendly neighborhood chiropractor, shrink and employment counselor. Yes, it was that bad! My morale was dragging, along with other parts of my anatomy; my self-esteem reached an all-time low; and my disposition became uncharacteristically testy. All this becase ergonomics was an unknown (or ignored) factor at the time of purchase.

Unfortunately, my salary has not yet reflected the acquisition of my new skill, but when one is trying to talk one's bosses into buying a new $300 chair and popping for another couple hundred bucks worth of peripheral creature comforts to soothe the savage senses, one does not overload the shopping cart.

I shall tactfully clip the Koffler and Dainoff articles and pass them along to my employers with the hope that they will read them and realize I have not just been a self-indulgent kvetch over the past 14 months and that, indeed, ergonomics is an essential factor to be considered in future additions to our automated office.

Thank you and the authors for a truly enlightening look at a serious but manageable OA problem.

Kay White
Office Manager
Rosse & Olszewski
Palo Alto, Calif.

CORRECTION

In "The User Interface" (*Computerworld OA*, March 31), the photographs of the Savin Information Station 1000 and the Wang Audio Workstation were transposed.

COMMENT

Office automation is proving to be an elusive goal. Vendors continue to proclaim OA in an ever-increasing drumroll of promises, but, so far, the majority of users have let the parade pass them by. What is holding many users back from utilizing the more advanced technology that OA offers? A major obstacle appears to be conceptualizing what OA can mean to specific organizations.

In this issue we have spotlighted a few of the companies that have taken the lead in office automation and are already thinking of OA as a basic organizational need. In OA, as in any new field, examining what other companies have already accomplished will often reveal what that field can offer you. Building on the experience of others can provide ideas and examples or indicate areas that should be avoided. Although no other company's needs will be exactly like yours, learning what they have done can encourage you to begin — and nothing can be accomplished until that happens.

Getting beyond the rhetoric and into reality is the first step. Few companies seem able to pinpoint the general technological opportunities in OA or to reduce those technologies to the specific applications needed in their organizations. Vendors are creating a huge ballyhoo about one or another of the new office technologies. But technology is meaningless until it is put to use. Applying OA technology to the specific needs of individual organizations is what it's all about. It is easy for MIS professionals and users to forget that office automation is not a "happening" but a continuing process to which, first, recognition of a need, and then forethought and continued planning must be applied.

Most of the Fortune 500 companies, and smaller companies as well, are hovering on the brink of automating their organizations. That's not to say that OA innovators don't already exist. They do, happily utilizing and usually expanding their automation usage throughout their organization, as we will show you with examples from Continental Illinois Bank, State Farm Insurance Companies and Lincoln National Life. Sometimes they've survived setbacks in their plans, sometimes even failures, but they and numerous other companies like them in the forefront are convinced there is no other way for them to operate — efficiently and profitably — than by using office automation.

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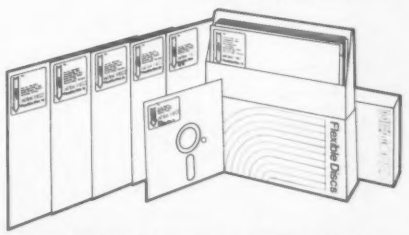

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OA

Q&A

We are finding, as a result of distributing word processing capability to the "casual user," that the equipment is underutilized, operator expertise is low, advanced capabilities are not used effectively and user management is not willing to adjust to the "computer-based, technical system."

The bottom line is that benefits are not being attained to the degree possible, and I suspect cost often outruns benefits. Would you please comment? Do other companies share this dilemma? Can we really put a terminal on every desk, as vendors suggest, and still have a good return on our investment?

You are not alone; in fact, you probably belong to the majority. One of the primary difficulties with implementing office systems is the diversity and number of job functions affected. In the professional/management area, especially, vendors and users alike are having difficulty defining needed features and how they should be implemented to satisfy both new and experienced users.

As to whether putting a terminal on every desk will result in a good return on investment, it will depend on three factors: their cost, frequency of use and how they are implemented. The desktop computer market is exploding because they are cheap, easy to implement and save a great deal of repetitive labor, even when used for spread-sheet analysis alone.

Your current situation can be addressed to some extent by taking three steps:

1. Perform a needs analysis. What business functions are performed by these "casual users," and which are met effectively by your current system? Could any problems be solved by the system if users had more training?

2. Train a key operator to help users get more out of the system.

3. Most drastic, explore the possibility of replacing your system. A new system, chosen in consultation with your users, may be your best alternative.

A last possibility is to reorganize your work flow to take advantage of a few highly skilled operators; you may be able to get by without your casual users having to learn more than the basic functions.

We have been taking stock of the word processing equipment in our divisions and find we have several different brands. Short of replacing our current equipment, is there any way to make our equipment compatible?

Several vendors sell "black boxes" that provide table conversion of formatting codes between the dominant WP vendors' products. Many of these products originally were designed to link word processors with phototypesetters. The going price for these boxes is in the $8,000 range.

You should be careful not to get your hopes too high, however, because there is a catch. Codes for which there is no equivalent cannot be converted and are usually flagged for operator attention. WP vendors have yet to offer much help in this area, preferring to make breaking out of the fold as difficult as possible for users. This situation is likely to change, at least among the smaller vendors, because it will better help them penetrate the installed bases of the dominant vendors.

Keep in mind as you go about linking up your WP systems that quite often there is no real need for compatibility. Even in a fully integrated office, not everything needs to talk to everything. Study the information flow between divisions to determine those that would benefit most from compatibility, and then start with them. In the longer term, you should institute policies that will encourage these users to buy compatibly through offers of greater support and other financial incentives. OA

Puzzled by a technological concept in OA? Bewildered by the failure of others in your organization to jump headfirst into automating the office? Readers are invited to share their questions, problems or solutions with others who are probably wracking their brains over the very same topics. Your questions will be answered by researchers at International Data Corp. Send your questions to Computerworld OA, *Q&A Department, Box 880, Framingham, Mass. 01701.*

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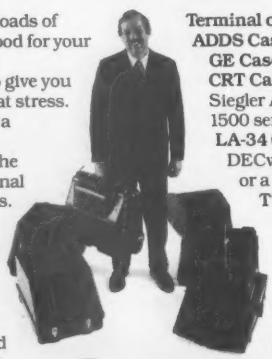

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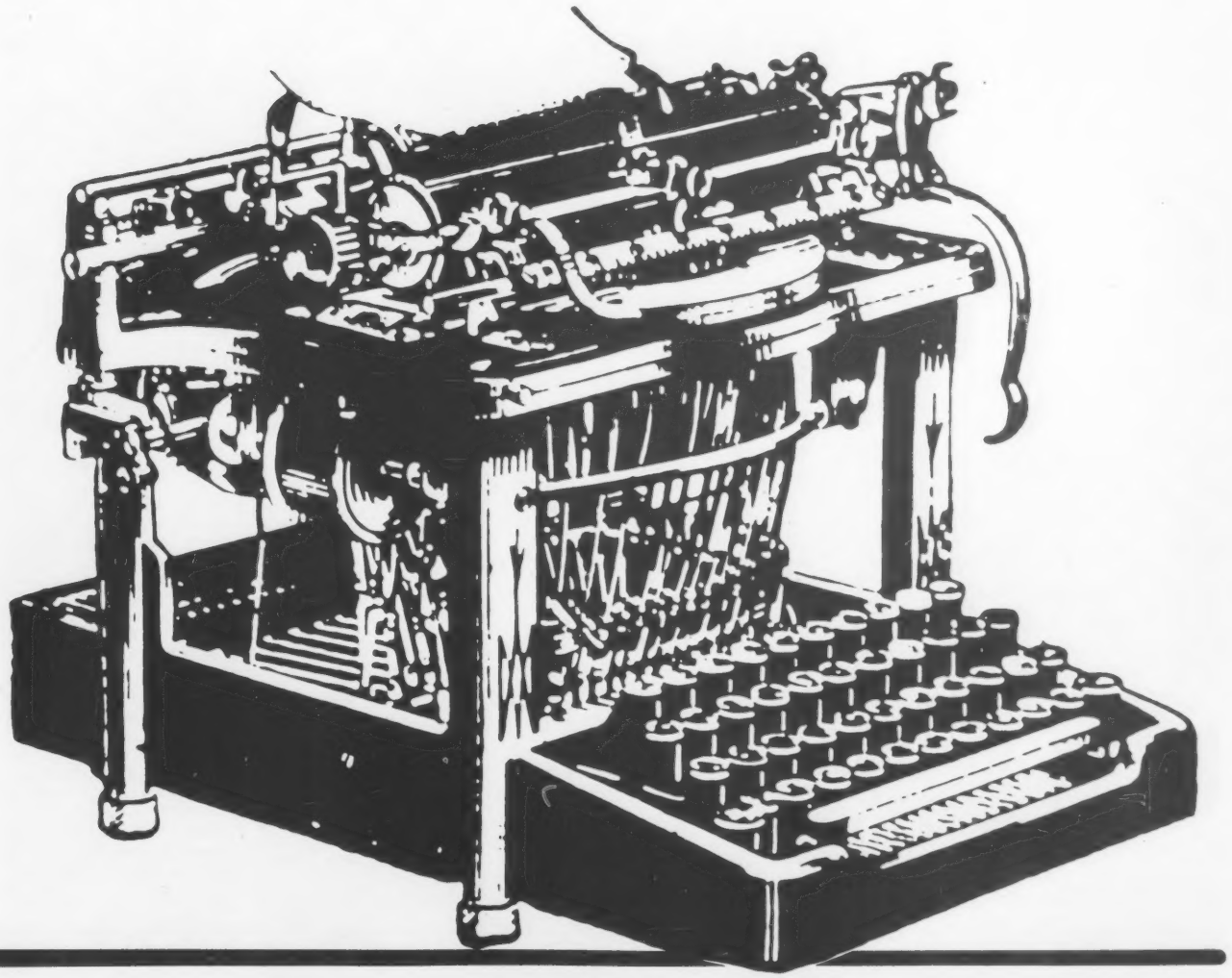
WHAT HAVE WE LEARNED?

Old Problems, New Answers

Changing technology, declining prices and evolving automation philosophies will radically change the way organizations are automated in the 1980s. The danger of making wrong decisions is great, but if we begin to act wisely now, the risks can be reduced.

Many of the problems in office systems today stem from the explosive growth of the word processing and data processing industries. WP — now a multibillion-dollar industry — came into being in 1964 with the introduction of the Magnetic Tape Selectric Typewriter and the coining of the term "word processing" by IBM. In 1980, the WP market was $2 billion in the U.S. alone, up from $830 million in 1978. The dramatic increase of these industries has created a serious management challenge. Different vendors, incompatible equipment, overlapping



BY LEE A. REINERTSEN & RONALD H. JENKS

capabilities and lack of orderly implementation plans have created confusion in both large and small companies.

It is not surprising that senior executives are in turmoil — staying current with the latest technology is necessary if competitive positions are to be maintained, but spending money unwisely reduces profit margins. Because of low unit costs, equipment can be acquired without senior management approval. Therefore, if senior management delays establishing an overall office automation (OA) policy, further unplanned equipment purchases will proliferate. On the other hand, if OA efforts are implemented incorrectly, righting past wrongs may cause much greater expenses later.

Let us take a step back and focus upon two main thrusts in OA. Centralization was by far the key implementation strategy for word processing for the 1970s. The high cost of WP equipment necessitated combining typing work loads to justify WP equipment expenditures. This equipment addressed only text processing, not the expanded office applications of list processing, mail merge, graphics, computing and so on that we are coming to expect as standard features in WP systems. With the added benefit of tighter management control and the consolidation or elimination of many typing positions — replacement of four dedicated typists by one WP operator was not uncommon — it was relatively easy to cost-justify centralization.

But with centralization also came headaches. The professional resisted losing or sharing his secretary. After typing was centralized, most secretaries were left with copying, filing and errand duties — all of which resulted in boredom and job dissatisfaction. When combined in work groups, many secretaries resisted reporting to former peers in lackluster dead-end career paths. To manage the centralizing function, new procedures had to be developed for WP chargebacks, files and records management, setting work priorities and inputting and revising documents. As situations became unwieldly, users once again had their secretaries type their work or made use of outside service bureaus.

If management delays setting an overall OA policy, unplanned equipment purchases will proliferate.

WP departments, in response to increased turnaround times and higher error rates, added supervisors, operators, proofreaders and equipment. The savings initially credited to WP often were offset over time, and the cost of producing a document may have been greater after WP was installed than it was before!

Vendors and users of WP and dictation equipment suffered from some common misconceptions. For one, original input is not speeded by WP; in fact, because of the higher initial set-up time, it may be slower than on a typewriter. Revisions can be completed faster, but only if work is revised less than 40% to 60%. As a result of moving cursors, inserting and deleting and the like, revisions take 40% to 60% longer than original input; it may be faster for the operator to completely retype some documents than to revise them.

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Central dictation was erroneously marketed as an important part of any WP center. Dictation is best for short documents of fewer than three pages, while word processing is most cost-effective for longer documents. Many centers nevertheless promoted dictation as the best input method, and the resulting expense and user dissatisfaction soon caused the abandonment of many centralized systems.

Forces affecting the more mature DP industry were different. Data processing already had been centralized in the '50s and '60s and was in the process of being decentralized.

Managers looked to distributed data processing to ease the headaches of centralization, the difficulties of juggling priorities, the long lead times for developing programs and the problems of quality control. As this occurred, communications costs would be reduced and backup distributed capability would be available to guard against more computer failures. Enhancing system modularity would result in processing functions tailored to the needs of the end user, with resulting better control over professional activities.

However, distribution ushered in other problems. Low equipment costs gave users the opportunity to circumvent central approval. Because central planning was bypassed, problems of proliferation occurred in many companies — data bases were incompatible, software costs skyrocketed, redundancy and duplication of effort occurred because of the lack of coordination and different languages and operating systems involved. Cost savings attributed to distributed processing were quickly reduced by its unmanaged growth.

Once again, the cost of operating many new systems may have been higher than for the older systems they replaced.

In spite of these problems and misconceptions, the potential payback caused the industries to grow rapidly, and this potential payback is enormous. It has been estimated that secretarial productivity can increase by 40% to 60% and professional productivity by 20% to 50%, a large savings opportunity for any organization.

Before these savings can be realized, however, changes have to take place. Planners have to rethink their strategies, vendors have to increase their offerings, prices must decrease further and someone has to manage the process. The office has to be thought of not just in terms of equipment, but also in terms of the professional, the secretary and the procedures and integration of systems and technology.

To accomplish these changes, we must understand some of the driving forces at work right now.

Foremost is the dramatic reduction in equipment prices. Five years ago, word processors cost $18,000 to $20,000 per workstation. Today, equipment with identical functionality is half the price (some units cost as low as $5,000). Similarly, microcomputers are being offered on the market for as little as $1,800, a fraction of the price of their larger, slower, less powerful counterparts of five years ago.

As vendors caught up with each other in equipment "bells and whistles," they began to offer new software applications to increase their products' marketability. No longer are word processors limited to the typing function. With math capability, sorting and selecting, graphics and important business application packages, users can now automate many activities and therefore justify equipment many different ways.

Similarly, microcomputers, formerly used for basic number crunching and requiring a knowledge of programming to operate, are now being used by non-DPers. New software packages allow them to be used for word processing, graphics and many other applications. As the capabilities of WP equipment and small business computers converge, they each address more and more of the requirements of today's professional and support staffs.

Many application packages are now available for paraprofessional and professional activities. A financial executive can use an application package for payroll, accounts receivable, accounts payable, budgeting and billing. Marketing staff can use sales analysis, advertising and promotion support. The manufacturing staff has at its disposal production scheduling, purchasing and inventory control packages. For the support staff, administrative aids such as schedules, calendars and ticklers placed at end-user sites are justified through increased productivity, response time and quality of service.

"There is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage than the creation of a new system. For the initiator has the enmity of all who would profit by the preservation of the old system and merely lukewarm defenders in those who would gain by the new one."

Machiavelli, 1513

The trend toward decentralization and distribution of data and word processing has begun to mushroom, and that trend is one of the biggest potential problems facing management today. To avoid unstructured proliferation and its accompanying problems, executives must take action soon. A systems development process is needed to prevent future costs from exceeding potential benefits. As vendors seek to integrate image, voice, text and DP technologies, users need to understand their own systems and requirements and the impact new equipment will have on their office environments. The unstructured proliferation approach to office automation will be too expensive in the 1980s.

The systems development process must be implemented — an accomplishment deemed difficult even by Machiavelli, who in 1513 said, "There is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage than the creation of a new system. For the initiator has the enmity of all who would profit by the preservation of the old system and merely lukewarm defenders in those who would gain by the new one."

Designing an automated office system requires a new conceptual framework focusing upon the totality and pattern of relationships in the office environment. The office system needs to be looked at holistically: people interacting with people, people with machines, machines with machines — all tied together by common objectives and the web of communication, procedures and information. Integrating the combined technologies of voice, data, word and image processing with the office environment requires a procedure of studying the entire system.

This procedure is not new. Our systems consultants have been using it for years in other functional areas. It is critical that it now be applied to the office. Two steps could turn failure into success. Although they appear to be cliches, they are in fact the best way to approach office automation.:

• Define objectives. It seems easy enough; however, this essential first step is the criterion by which success or failure will be judged later.

Objectives should extend beyond a department or area, section or division. They should flow from strategic and tactical business plans. Typically, they include organizational objectives; competitive strategies such as acquisition, divestiture and merger; market growth projections; legislative trends; and technological developments.

Defining objectives from the top down means the impact to the entire system can be reviewed and examined at the required level of detail. If overall business plans do not support automation efforts, beginning from the bottom up wastes time and effort.

• Develop a plan. Depending upon the depth and scope of the objective, many plans can be developed: application systems plans; plans for personnel, equipment and facilities; and overall plans that tie efforts together and provide feedback to future plans.

The planning process should be viewed as a dynamic ever-changing, ever-evolving, ever-integrating process. It can be applied to every level of management and every office system. **OA**

Jenks is the director of management information and Reinertsen is the director of office systems planning at Touche Ross and Co. in its New York corporate headquarters.

Humanize Your Terminals

In the Beginning...

THE FEASIBILITY STUDY

Generalized information about office automation can take you only so far. Before beginning an OA plan, you and your management team will have to support the case for automation with data gathered from your own organization.

Often, the first major step is a presentation — a set of specific recommendations that attempt to bridge the gap between the state of the art (office

BY JACQUES T. GARON

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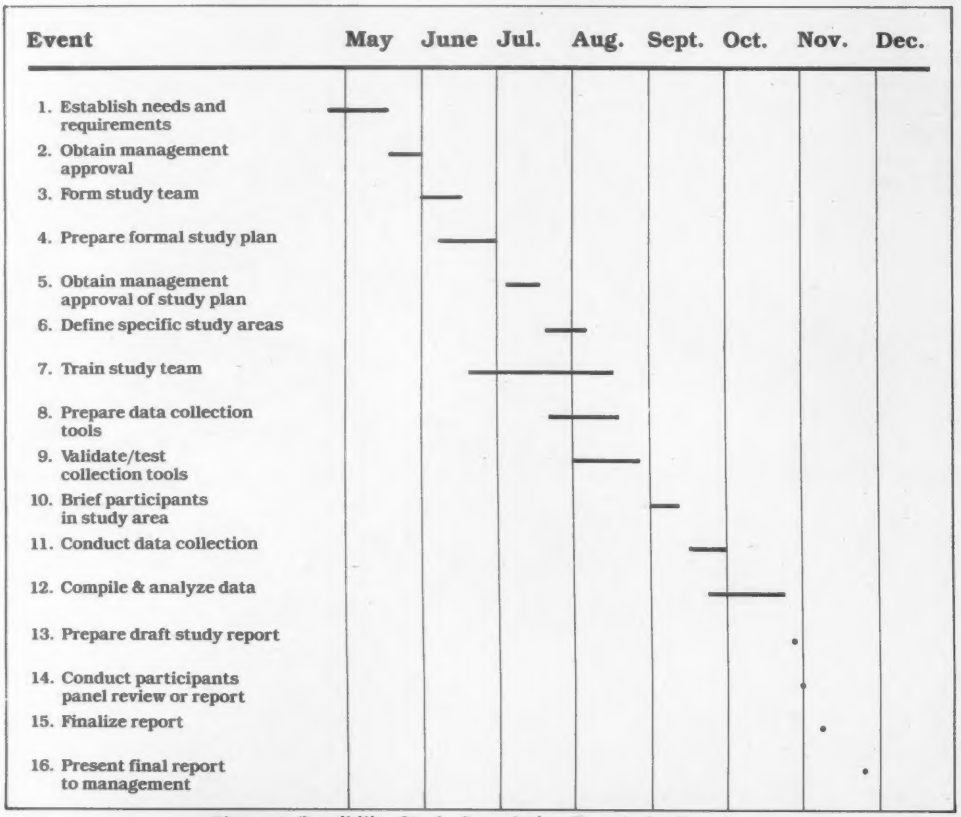

Figure 1. Feasibility Study Completion Targets for Events

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technology available) and the state of actual practice (systems that will actually work in your company).

An office systems feasibility study lays the cornerstone for your presentation. Properly conducted, the study will document characteristics of key activities currently performed and will identify opportunities to improve effectiveness and efficiency through various combinations of procedures and technologies. The study provides a basis for comparing recommendations with actual results and forms a reference point for participants in subsequent studies.

The first topic to consider is resistance to change. Because it is easier and more comfortable for executive and administrative support staff to continue with the traditional office organization, the mere mention of change can create resistance. A mismanaged attempt at change can produce problems that not only will ensure the project's failure, but could also cause a serious disruption in the firm's basic operations.

A feasibility study can add to the smooth transition, implementation and acceptance of an office system. Those personally affected by potential changes should be directly involved in the study, which will lessen their fear or reluctance. Throughout the study, it will be possible to present a detailed objective report on current office procedures and functions. Presented in an organized form, such a study can promote the confidence and cooperation of those involved.

Obtaining the approval of top management to conduct an OA feasibility study will not open every door in the organization, however. After the survey objectives have been established, define the areas in which the survey is to be conducted, design the survey plans and form the study team. At that point, obtain permission from each area's manager or supervisor to enter their respective areas.

The preparation of a three- to five-page statement of work containing a list of team members, the plan of work, the study objectives and a signed executive order to proceed should be given to each area manager or supervisor. Each of these people should also be given a briefing of 10 to 15 minutes and an opportunity to ask questions. This will prevent or limit later confusion or misunderstanding about who, what, why, when and how the study was to be conducted.

It is important to remember that as soon as you think office automation, you are thinking about office reorganization. You are planning to change:

- Work tools.
- Procedures with which people work.
- Work habits, sometimes of many years' duration.
- Relationships, both working and personal.
- Supervisory practices.
- The way people view themselves.

It is not equipment that makes the automated office productive or successful. It is people. To achieve this success, people are asked to change, and change is difficult for some and terrifying for others. All of these factors form a good reason to obtain full commitment from top management.

Let's briefly review some of the benefits of doing a study:

1. The study provides an opportunity to develop systems that meet a wider range of near- and long-term requirements than was previously possible. By taking the approach that a study should be concerned with information in all forms, and with information-related activities of all kinds, you establish the potential for systems that meet major user requirements and interface logically with each other. In addition, one study team conducting one study uses time more efficiently, and time is important for both study-team members and the user department staff members who supply data. Several studies by several teams, each representing a particular specialty, is a considerably less efficient method.

2. The study helps to sell and implement OA. It provides the quantity and quality of data for preparing and defending findings and recommendations. Findings from other departments or organi-

zations can help persuade users to experiment, but information from the users' own area makes the most effective "sales presentation." Data from an internal study can establish credibility for a new system. The study can also help if acceptance of a worthwhile existing system or technology has stalled because proper data was not gathered.

3. The study leads the way for combining the resources of separate information systems entities into a single more effective entity. This opportunity has important implications for organizations in which the administrative services and management information systems (MIS) functions are separate organizational entities, reporting to different corporate officers. Each group has specific strengths in its area of specialization, but generally exhibits weaknesses in other areas of information management. A systems study team that draws from all information processing disciplines can apply this multidisciplinary approach in the design and installation of systems. This approach provides the best means for realizing all the opportunities discussed so far. The study team also paves the way for an affiliation between administrative services and MIS under a corporate information resources function.

In short, how can you really know how to use OA to achieve greater productivity and new capabilities profitably without knowing what you are presently doing, how you are doing it and how much it presently costs? How can you convince management to spend what might be large sums of money? Without a feasability study, how will you later demonstrate to management that these expenditures are cost-effective?

An office systems study with a broad scope may include all activities relating to information — use of dictation, effectiveness of meetings, manual posting and handwriting, filing and retrieving techniques, requirements for file space and more. This approach is more effective if operational groups are either represented on the study team or standing on the sidelines, willing and able to act on the resulting findings and recommendations. Studying the typing function in detail and recommending text editors is risky and probably pointless if the group responsible for implementing the recommendations does not have the budget, staff or inclination to follow through.

The broad scope is useful if the study team knows very little about an area. It is also the approach to use when evaluating innovative systems or technologies for which limited data exists on how the equipment's capabilities can best be utilized.

Concentration on fewer activities has its benefits, too. The limited scope is the most efficient avenue for evaluating potential users of specific systems or technologies. People who generate large reports with many distribution copies and high postage charges, for example, can provide valuable data for evaluating a computer output microfilm or an intelligent copier system. A department with large filing/retrieving requirements may be the focus of a study on that activity alone.

The OA feasibility study team of professionals, management engineers, management consultants, work flow analysts and equipment and design specialists is most effective when supplemented by team members from the areas under study. They provide the day-to-day communications between the team and the personnel being studied.

In any feasibility study, the involvement of those who will be directly affected by the introduction of an OA system cannot be overemphasized. These people are invaluable because they are familiar with work areas and procedures, are the eventual operators and users of the system and know the current equipment and its applications. In addition, they are the best communicators of study requirements, which also eliminates rumors.

The study team should be comprised of administrative professionals and analysts and office operation technicians. These two groups should be composed of the following members, with their numbers varying by the size of the study:

Professionals and Analysts
- Project Director
- Systems Designer
- Senior Analysts
- Management Engineers
- Equipment Analysts
- Economic Analysts
- Outside Consultants
- Manufacturers' Personnel

Office Operation Technicians
- Departmental Coordinator
- Division/Branch/Section Representatives
- Personnel Department Representative

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Use of outside consultants should be monitored very carefully. They should be included in the team, but not necessarily be the main participants. One advantage of including them is that they are highly knowledgeable in OA technologies. They have the expertise and resources, so work with them toward your goals.

Office systems vendors are another source of outside assistance. Bear in mind that they are in the business of selling equipment; there may be a conflict of interest. Because most vendors believe their equipment to be the best and carry a line of compatible equipment from the automated typewriter through the totally automated office, you may not want to involve them in the final stages of choosing the equipment.

Forecasting the time required for a study is essential to the planning process. One simple rule of thumb seems to work well. Allow approximately 1.25 team-member days for each participant if a study satisfies the following criteria: The study deals with a broad range of information handling activities, uses original questionnaires and follow-up interviews with each participant and produces a written study report and an oral presentation.

1. Present study concept to management	1 Day
2. Understand/learn office automation concept	1 Week
3. Establish study objectives and scope; obtain formal approval to proceed; form study team; form steering committee	1 Week
4. Determine sequence of activities and schedule	1 Day
5. Determine measurement methods	1 Day
6. Prepare study tools	1 Day to 1 Week
7. Prepare study announcement	2-3 Days
8. Announce areas to be surveyed	2 Days

Figure 2. Presurvey Activities Timetable

To compute the length of the study, simply multiply the number of planned respondents times 1.25, then divide by the number of team members. For example, a four-person team conducting a study that requires questionnaire/interview responses from 16 participants should budget about five days (16 X 1.25 ÷ 4).

Learn about all the different technologies included in OA: word processing, data processing, micrographics, typesetting, electronic communications and so on. At your first meeting, ask each member of the study team to describe briefly his own discipline and to show how it fits the total OA picture.

Attend symposia, seminars and OA conferences. Seminar participation exposes you to others involved with OA on a small or large scale or considering some changes in their present setup. Visit trade shows. You can see equipment from many manufacturers displayed in one location. Sales representatives are only too happy to demonstrate equipment and answer questions. Frequently, they will offer assistance with your study.

Whenever possible, visit firms operating integrated office systems. Such visits will give you an insight you can't get by other means. Management, supervisors and clerical personnel in these companies have significant practical knowledge that exists only in the personal experiences of those who have "lived through" the installation of the different components of the integrated office.

A frank discussion of not only the success but the problems they encountered can help the study team avoid making the same or similar mistakes. The study group probably will never find the "perfect" example of an office system, if for no other reason than that each system must meet and is designed to meet the specific needs of each firm. Knowing this, however, should not deter the study group from visiting such firms.

OA systems studies have four phases: presurvey, survey, implementation and postimplementation.

PRESURVEY ACTIVITIES

Scheduling:

☐ Set up an event chart or timetable and develop a detailed plan for the study. Decide on an

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appropriate time to carry out the study, avoiding peak, valley and vacation periods. You must establish a schedule and stick to it. It is deceptively easy to become bogged down along the way or to be diverted by those who do not really want the survey to be completed. The schedule should clearly establish the completion date of each phase of the study (See Figure 1 on Page 12 for sample targets).

Preliminary Activities:

☐ Set objectives; identify problems.

☐ Assemble the study team.

The team is responsible for:

- Preventing duplication of hardware and software purchases.
- Maximizing the use of present equipment.
- Introducing cooperative sharing.
- Evaluating present systems.
- Maintaining a sense of company purpose and direction.
- Developing communications throughout the organization.
- Identifying competent people who can contribute to the objectives.
- Assisting in the design of the forms.
- Deciding the time to conduct the study.
- Assisting in interpetation and validity of the data.

The study team will be able to interpret the study to fellow employees. Conduct a team meeting and decide who will be involved and how.

☐ Gather samples of all work, including names of documents.

☐ Obtain present and proposed organization charts. A summary of current staff organization is needed to lend perspective. The anticipated improvements of the office system should be illustrated. Obtain lists of administrative support staff and their reporting relationships, together with salaries.

☐ Prior to the commencement of the data collection, design or borrow forms to collect the data and test their validity and ease of completion. Make a trial run on how to properly fill them in, stressing to the administrative support staff the rationale for collecting typing and administrative task information. The effectiveness of the study is dependent on their responsibility in providing accurate accounts of their work.

Publicity: A notice advising all personnel of the feasibility study should be made by the heads of the departments, giving dates of study and goals. Use of company newsletters, bulletins and notice boards also helps to spread the word.

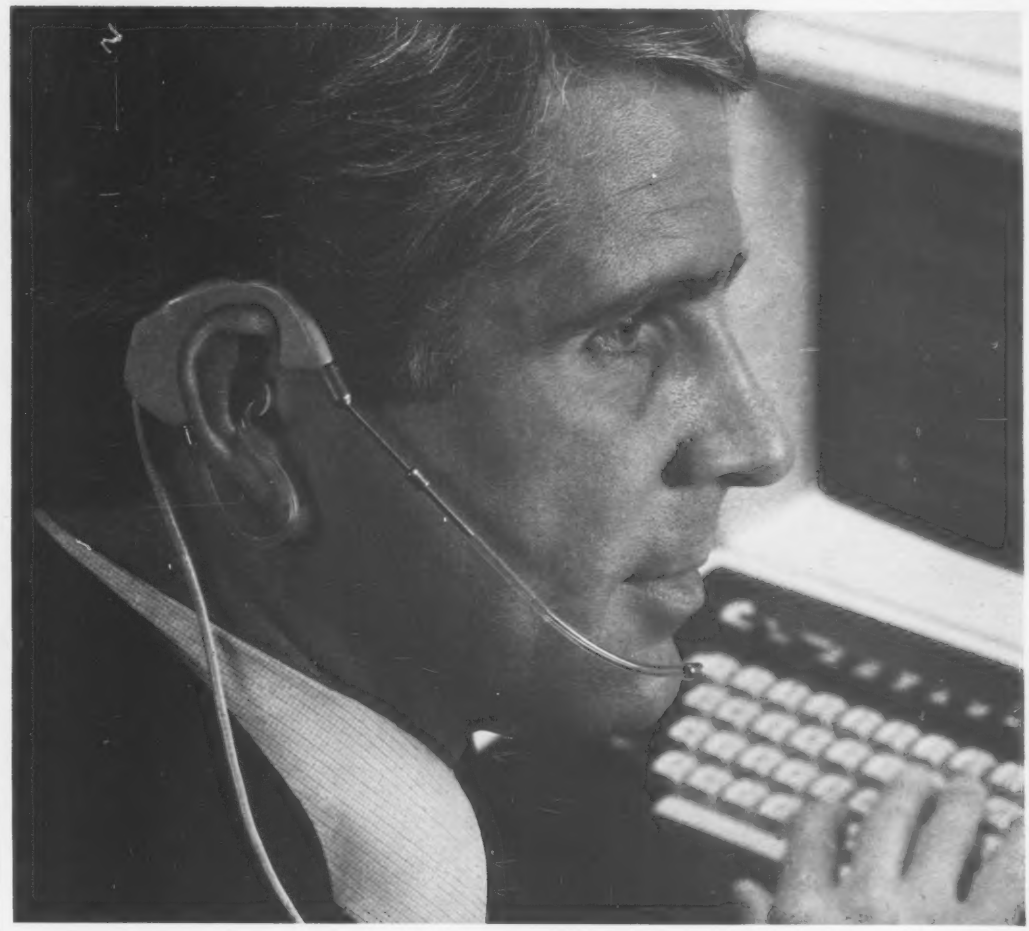
Orientation: Set up orientation sessions for the involved staff to acquaint them with OA. Simultaneous briefings for management and support staff should be held. Outline the study and its goals, go over the various steps involved, explain the tools in detail and answer questions. You may also wish to show a film on OA.

Completing Preparations: As part of the orientation, presentations will have to be made to group meetings. The professional attitude and delivery displayed at these meetings can set the image and tone of the entire feasibility study. The presentations must be well planned so that they will contribute to the study's effectiveness and success. Techniques and procedures selected to complete the study must work smoothly.

If possible, test the efficiency of the presentations on an experimental group. Here again, it is essential that the study group be concerned with creating a favorable impression for the study. OA

This concludes Part I of a two-part article. Part II will cover the survey, implementation and postimplementation phases.

Garon is president of Word Processing Services of New York, an OA consulting firm.



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A User's Perspective

Continental Illinois Bank, the country's seventh largest bank, is one of the leading-edge users of office automation. Douglas Bott, 13-year veteran with Continental and vice-president of its information systems, was instrumental in the applications development planning and day-to-day operation of the bank's automated system. Bott has been refining office automation at Continental for the past five years. Computerworld OA*'s editor, Ann Dooley, talked with him about what he has learned in that time.*

Most companies are just beginning their office automation activity. Why did Continental venture into OA so much earlier than other firms?

We recognized a need for the organization to have certain functions performed. People were asking to see data that would help in their decision making. They knew the data had been collected, but it was inaccessible to them. We decided to follow this path as a way of responding to people's demands. We thought it made a lot of sense and it would help people do their jobs better.

Was the move into office automation spearheaded by top management?

The thrust came from the systems department, which was the driving entity in almost every case. We started with very small pilots that didn't require

OA At Continental

Continental began a full-scale program to automate its professionals and managers as long ago as 1977, when most other companies had only heard rumors of the "office of the future." Using existing technology, Continental has built a central data base of information which can be accessed from almost any location by a network of terminals. Continental began its venture into OA in 1975 with several small WP centers.

In 1977, the systems department began implementing four major products:

- Its ad hoc reporting package, a user-driven reporting language that provides users with very fast response time in obtaining requested data.
- An electronic mail system, which began as a pilot with 56 people. The relatively unsophisticated system was built in about a six-week time period and was intended to handle up to 300 people. It now has about 5,000 users, predominantly professionals and managers — 80% of whom are now up on the system. Mail can be routed and distributed interoffice or to another country where the bank has offices. About 100,000 original documents are created each month.
- A general-purpose on-line query language, Iris. It currently is used by about 4,000 bank employees. Iris is similar to a central librarian that provides access and compiles information about any material an individual has access to. The data base has up to 45 days of cleared checks; more than 1.5 million checks are processed daily.
- The telephone-answering machine — one of the least sophisticated pieces of technology in Continental's OA program. About 400 bank employees whose jobs do not bring them into contact with the public use the machine.

Substantial effort went into making people feel comfortable with the products, integrating the products with each other and allowing information to be passed along in the usual office work flow process.

Convenience computing, Continental's alternative to the personal computer, was the bank's next add-on function. It allows a person to dial into a terminal and write a basic program. Visicalc and a variety of other packages can be run on Convenience computing.

Continental's purpose is to provide professional users with the highest amount of function possible, regardless of location. The most difficult problem is coordinating the paper-based work that comes in from other locations and then routing it among Continental's various offices in the city, Bott said.

massive amounts of resources. The pilots would open the door a little bit and if it seemed like a good idea, we would expand. Electronic mail, for instance, does not have to be a tremendous corporate expense. Most of the products we introduced were based upon incrementally small enhancements and pilots.

Were users eager to have their functions automated or did it require a real selling job?

You find all flavors. You have the people who are very adaptive and not the same people are adaptive on all the same products. We pinpointed areas where we thought automating functions would prove most beneficial and help the most people. Some people didn't want to use it, and there are still some today who haven't yet decided there is enough function and value in it for them. But I believe most if not all of them will eventually come around. It hasn't been an organizational fiat that everyone must use it.

One of the strongest impetuses for automating the organization is that the products are being used because people believe in them — not because somebody says they must.

Who is in charge of the program?

It spans the entire organization. Most of the development function is in my area. The data center has to run it and provide good response time. And since we ourselves are big users, it is a stimulus on both sides. We can see the benefit ourselves, which helps in providing service.

Who was involved in the actual planning of the system? Was it as large a group as those involved in running it?

No, it was smaller. No more than three or four product managers are involved. It's their job to target future products and keep in touch with any problems people may have with current products. These people also perform mar-

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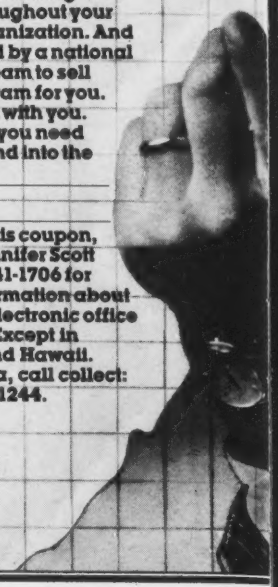

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keting duties, so they have dual responsibility. The next evolution of our system will be when the product capabilities are exported to the bank's customers. We're seeing adaptations of products to meet other needs.

How was OA introduced at Continental?

Everything was done on a very small scale with incremental additions. You pick areas, find pockets of people who are interested in starting, work that pocket for a while and then find another pocket. When people don't want to use the technology, you just walk away from them and come back another day when the person is ready or the technology is more acceptable. It tallies with the individual's learning curve: some move up faster and some slower. I don't think faster is good or bad. People adapt to automation differently. Some managers choose to have their secretaries access their mail, for instance.

It seems as though there is almost a kind of laissez faire attitude regarding office automation at Continental. Is this true?

The role of the marketing person comes into play here. It's their responsibility to convince people to use the products. We don't force usage, but we do encourage it. The marketing people are out, spending a lot of time with users, talking to them, putting up data bases for them, showing them how to use mail and communicate with others. They are the ones who have the responsibility of moving it through the organization. Laissez faire doesn't really describe how we do it. We may give people an option of using or not using OA, but we also have people who try and motivate others.

Many companies are grappling with the problem of quantifying the benefits OA can bring. Did Continental expect to increase productivity or decrease costs by a certain amount? Or did the bank simply decide there was a need and therefore made the decision to go ahead?

The biggest objective we had in the process was to bring the fruits of DP to the largest number of people in the organization. By eliminating redundancy or tasks that require multiple people, the individual can go to the terminal and get data himself — and get it faster. Our emphasis was on improving productivity, but was not for any specific number in a specific time frame.

We felt people were their own best judges of how they spent their time and would use the products if they were worthwhile.

Have any follow-up studies been conducted to find out what benefits have been derived?

I'd be hard pressed to give a number to show how much better off anyone is. What's happened in our organization is that we've had these technologies for so long that people forget what it was like before they had them. It's like calling people and asking what benefit they get from the telephone; you can't relate to it any more. It becomes part of the work environment.

What is the relationship between OA and DP at Continental?

They are closely linked. We have been able to share resources, which cuts down on the number of different kinds of equipment needed. Continental has one preferred vendor, while most other companies have to deal with multiple WP vendors. That's a problem I can't relate to.

People have high expectations about DP which were probably not satisfied throughout the course of the '70s. A lot of promises are floating around in the environment, raising expectation levels and, unfortunately, many of them will be disappointed. Some companies are waiting for vendors to make announcements about products so that they can make a decision on direction. I'm not sure that the vendor announcments will ever provide everybody with everything.

You are addressing the process of OA from a large data base perspective. Do you see any advantage to building a network with numerous mini and personal computers?

It's hard to tell what's best for anybody else. We're offering convenience computing as an alternative because we have 4,000 terminals out there. We don't want to get to the point where there are seven or eight terminals on someone's desk, each doing something different. We are trying to migrate to where one terminal allows you to provide the broadest array of function. That's an important concept.

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Those who have chosen to go alternative ways will have difficulty pulling it together. Processing would be done in a number of different divisions and how could you avoid a redundant set of tools? Another advantage is that if somebody writes a program on our convenience computing, we can share it with every other user. That's a little harder to do when everyone has different machines.

What are the biggest benefits of automating the office?

We would quite simply have a hard time surviving without it. I really believe that. When I just think about how much it has helped expedite the communications process, it's just been fantastic. You can get things turned around so much faster — they don't get lost or disappear. Data gets handled more quickly and more efficiently, and users tend to get more complete information.

Training is becoming a critical issue in OA. How is training handled at Continental?

Some training is done in a three-hour CAI course and the rest is done in person. It depends on what each person wants. We can train more people electronically than we could ever train in person. One benefit of the electronic training is it gets you hooked up to the keyboard so you can learn about the terminal and realize it won't bite.

What kind of problems did you encounter in implementation?

One of the lessons we've learned is the problem of being too successful. Growing too quickly in an application without being able to support it effectively means that some problems can develop — like response time of equipment. Professionals and managers are above and beyond the most finicky people you can find. They like two-second response time. It's very important as you go through pilots to grow in relation to the number of people you can service.

The other problem is getting your arms around the application or, in other words, having some sort of strategy. Don't expect anybody to provide all the answers. You're not going to find one person that's going to do everything. Pilot. Experiment. Experimentation is an item that is very frequently overlooked. Do it, but remember to make it cheap and make it deliverable.

What general advice do you have for users unsure of how to automate their organizations?

Start. That would be my biggest advice. Many people show a great reluctance to start. Too many organizations are playing around with deciding who should be in charge. Somebody has to decide they want to do it. I believe that if you keep it with the pilots and keep it simple, just by starting, you'll be a lot farther along than anybody else. It's hard to say what the whole pie is going to be like and in fact I would encourage people not to do that. You don't have to start with a whole integrated package. Take one of the pieces, figure out what you're going to do, make a pilot in one area, expand it if it's successful, learn something from it and continue to move forward. Somebody needs to drive it — to say, yes, I want to make it happen and I will see that it does. If there isn't anyone to make it happen, it won't.

It seems that Continental was innovative in starting OA early, but is conservative from the standpoint that the company avoided developing technology and stayed with the old standbys. Is this true?

Most of the technologies we applied already existed to perform these or other functions. One of the most difficult decisions for us and for any user is to pick and choose among vendors that will supply the technology you're looking for. It's unlikely you'll find a vendor with the ultimate package that would supply the needs you'd have for ever more. We decided to use the best pieces of the package that various people had and then attempted to interface them, make them user friendly and put in a little front-end activity to get a professional or manager to utilize them.

Is the marketplace currently being user- or vendor-driven?

Vendor-driven. The vendors are predominantly out doing the selling of the wares. Users are being sold the concept that all they have to do is come see, and all their problems will be solved. The situation will change only as more people do something. Vendors will continue to drive people who don't understand what OA is all about so that they in turn can drive the vendors. **OA**

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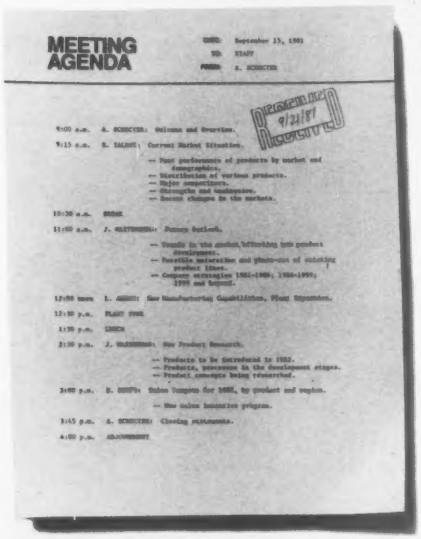
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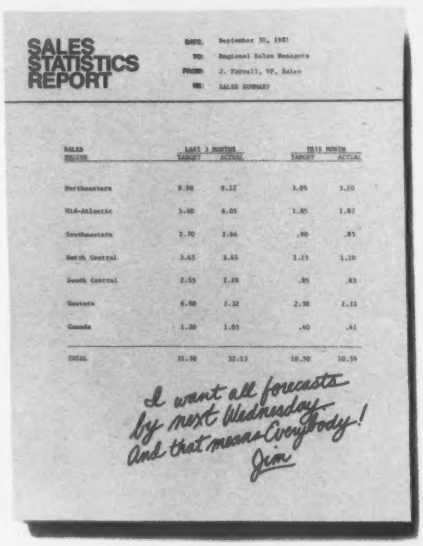
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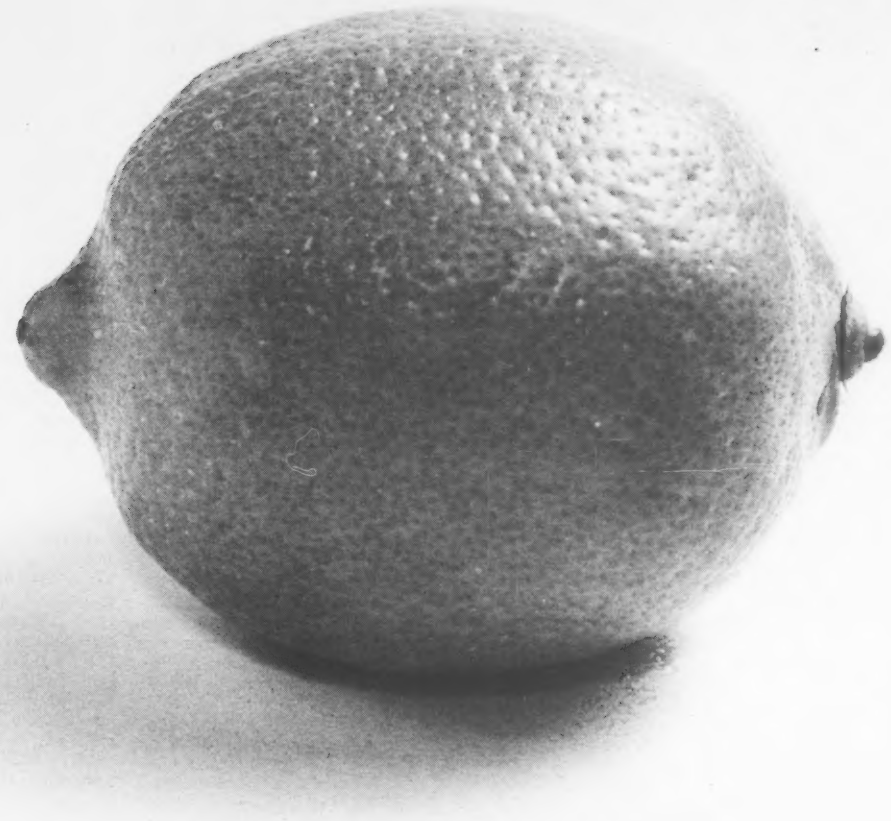

Photo by Bruce Iverson, 1982

Legal Contracts

Office automation will cost users billions of dollars in 1982, but most purchasers will pay no more attention to the contracts they sign when acquiring OA equipment than they will to the purchase of their office typewriters. Because the acquisition of OA equipment represents a significant dollar expenditure, purchasers should be aware of the legal issues involved.

The procurement of OA equipment should follow organized acquisition procedures. A request for proposal (RFP) offers an excellent medium for specifying contractual as well as technical requirements. If the user

(Continued on Page 22)

BY THOMAS R. MYLOTT III

Vendor Selection

Office automation technology has grown rapidly in recent years and more than 100 vendors currently compete for market attention. Users, trying to determine which of these vendors can best satisfy their unique needs, face a difficult decision process.

The method used to evaluate an OA vendor should provide very specific and relevant information that will result in:

- Minimum disruption in your organization from the introduction of OA equipment.
- Strong backup support from each vendor selected.

(Continued on Page 64)

BY FRANK D. GIRARD

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needs some particular contractual provision such as an extended warranty or guaranteed trade-in allowance, the RFP is the means by which to alert a vendor. The RFP should also require that all vendors' proposals include their proposed contracts. Obtaining contracts in advance offers a two-fold advantage: The user's attorney will have time to review the documents, and the user will be able to determine how responsive the vendor has been to the RFP.

At some point, the vendor will probably give a marketing demonstration of its equipment. The user should make notes of all vendor promises (such as speed or capacity of the equipment) so these promises and representations can be incorporated into the contract with the vendor.

The user will have greater leverage if he commences negotiations with more than one vendor and makes all vendors aware of the simultaneous discussions. The best negotiating strategy is to ignore the vendor's standard contract and to offer one's own agreement. The user's contract should be fair to both parties and should include the promises and representations the vendor made in marketing the equipment. By offering his own contract, the user avoids the one-sided terms found in most vendors' standard contracts and forces the vendor either to agree to support marketing representations and promises or to disavow them.

Sometimes the dollar amount of a purchase will not justify the vendor's expending substantial resources on contract negotiations. In this instance, a vendor will often insist that the user take the vendor's contract. As a compromise, the parties can draft an addendum to the contract.

During the negotiations, the user should try to negotiate with someone who has the authority to obligate the vendor. If the transaction is substantial, the user should insist on this. As a general rule, marketing representatives do not have such authority. If the vendor will not provide senior management for negotiations and instead insists that some other level of management has the authority to negotiate, get a written statement of the negotiator's authority.

When a vendor insists on using its standard contracts, the local marketing personnel often will attempt to placate the user by offering a "side" or "letter" agreement. For the most part, such agreements have a legal value located somewhere between insignificance and nothing. When a vendor's staff proposes such an agreement, the user should know the vendor's senior management has not authorized the terms of the "side" or "letter" agreement. Enforcing those terms will be difficult, if not impossible.

Worst of all is when the vendor's marketing representatives utter the third most insincere phrase in the English language, "trust me." Very few vendor personnel are dishonest, but their honesty is irrelevant. This request by the vendor is simply unreasonable; the vendor will not trust the user without a written agreement. Although the marketing personnel may be very trustworthy, they are unlikely to have sufficient authority or influence to compel the vendor to keep the marketing representative's promises.

The actual drafting of a contract for equipment involves evaluating many issues. First, the contract should specify what the vendor is selling. That is, the specifications for both the software, if any, and the hardware should be incorporated by reference into the agreement. Users should examine specifications carefully to ensure that they describe the goods as the user understands them. For example, a user purchasing a word processing system might require that the system be capable of on-line storage of the equivalent of 1,000 legal-size typewritten pages. If the specifications do not indicate capacity or if they describe a capacity that is too small, the user is far better off uncovering the problem before signing the agreement.

Most vendor contracts indicate delivery will occur at the vendor's factory after placing the equipment in the control of a common carrier. While most of the time there is no compelling reason to object to this kind of delivery, the user should be aware that from delivery on, the user usually bears the risk of loss. Therefore, if the freight company pulverizes a piece of equipment, the user will still have to pay the vendor for that equipment. Adequate insurance must exist for the equipment starting from the time of delivery. Most vendors are willing to arrange for this.

The transfer of the hardware title is one aspect of acquisition that is often confusing. It is possible for a user to be in possession of and using equipment without actually owning it. Full ownership is not acquired unless and until the vendor tranfers title to the user. The contract should clearly state when title transfer occurs.

Many vendors retain a security interest in the hardware. A security interest is like a mortgage. When the vendor has received full payment for the hardware, the contract should provide for the termination of the security interest. Otherwise, some security interests could continue so long as there was some continuing payment (for maintenance, for example) owed to the vendor.

Installation of the equipment is obviously a critical step. Many vendor contracts specify that after installation and upon the successful completion of the vendor's tests, the user accepts the equipment. Depending on the type of equipment, this vendor term can be very unreasonable — particularly with a new product.

Acceptance means the user has lost the right to reject the equipment. This right is important not only because vendor tests do not always uncover damage or defects in equipment, but also because even undamaged equipment sometimes will not work in accordance with its specifications. The user should have the opportunity to inspect and evaluate the equipment for a reasonable period of time. That period will vary depending upon circumstances. The contract should provide some way for the user to accept or reject — formally, in writing — the equipment and should give the vendor some time to attempt to remedy whatever problems exist.

Users of licensed software do not own the software, but rather have the owner's permission to use and possess it. Generally, a license will specify restrictions that the user must follow. License terms may vary considerably. The OA purchaser should review these items closely and request modifications where necessary. The license review is important because failure to adhere to its terms is a breach of the contract with the vendor. The uninitiated can easily fall into a trap.

An important protection for the user is a vendor's indemnification of the user for all patent, trademark, copyright and trade-secret violations arising out of the use of the vendor's products. Most vendor agreements include protection for the first three, but omit the fourth. The indemnity for trade secrets may be important, particularly when the vendor is licensing software.

Users should ensure that provisions exist in the contract for maintenance of hardware and, if appropriate, of software. Some items to consider when evaluating maintenance contracts are preventive maintenance, response time to service calls and repair time. The best time to negotiate maintenance is during, not after, the acquisition of the equipment. Concentrate maintenance negotiations on service issues, not on price issues. Good maintenance is expensive and usually worth the cost. Except perhaps for preventive maintenance, the user should not have to pay for maintenance until the warranties expire.

Many users are experienced with computer or OA technology and want to convert data stored on their current equipment to the new equipment. If the vendor has promised to assist in the conversion, the contract must be explicit in specifying who does what, which party is responsible for fixing problems and what the timetable is for conversion.

Another area, and one that is often overlooked, is that of a thorough evaluation of training. The extent and adequacy of training will be critical; its absence can render the equipment useless to the user.

Some OA equipment requires a great deal more training than others, and some training requires that trainees already possess certain skills. If some uncertainty exists about how much training will be required, the vendor should be made responsible for providing all training necessary and useful for the operation of the equipment. If the vendor requires that trainees have prerequisite skills or if no special skills are needed, the contract should indicate that.

Warranties are items that some users do evaluate. Depending on how they are combined, several components of warranties can completely alter a warranty's value. Some of these components are the duration of the warranty, remedies for problems (e.g. on-site repair or return to factory), notification of problems, interrelationship with maintenance contracts and connection with other vendors' equipment. If software is provided with the hardware, the warranty should explicitly accommodate both. Coupled with warranties, most vendors have limitations of liability and warranty disclaimers. Some of these provisions are of dubious legal validity. However, few vendors will modify them substantially. For the most part, these limitations and disclaimers are reasonable. They are unreasonable when they are one-sided. A vendor should be willing to make the limitation of liabilities applicable to both parties.

One of the most important provisions of an agreement is a section often called an integration provision, which generally states that "the written contract is the final agreement of the parties and that there are no other written or oral agreements between the parties." This means that no matter what the marketing representatives, the regional management or the board of directors stated to the user (orally or in writing), promises and representations impose no legal obligation on the vendor if they are not in the written contract.

The significance of written agreements in the acquisition of OA equipment will vary in importance from material to vital. A contract is the most effective means of identifying the rights, responsibilities and expectations of the parties. OA

Mylott is an attorney with the Dallas, Texas, law firm of Peter S. Vogel, P.C., which specializes in computer matters and related litigation.

Weighing The Options

Will They Work . . .

Personal computers do not necessarily make good word processors. This may be one of the least recognized adages in the industry today, especially in view of the proliferation of WP/micro software packages. If you are on the market for a personal computer to perform text editing, be careful. If you are not already familiar with the basics of word processing systems, find someone who is and

(Continued on Page 68)

. . . Or Won't They?

It is no secret that microcomputer technology is growing faster than any one person can track and that it is having a profound impact on businesses of all sizes.

The centralized DP department is no longer the only purchaser of computers. In the past five years, we have seen a prodigious growth in the number of professionals and managers who, with departmental funds,

(Continued on Page 26)

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Norman Rockwell

BY THOM HOLMES | BY LAWRENCE F. VOGEL

OFFICE AUTOMATION IS HERE. SO IS OUR NEW FASTRAK™ TERMINAL.

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- broadband local area networking
- up to 16 loadable character sets
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- integrated service processor
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FASTRAK features include:

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- voice store and forward
- high resolution graphics
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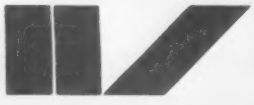
- display segmentation
- ergonomic design
- detached keyboard
- multiple display formats



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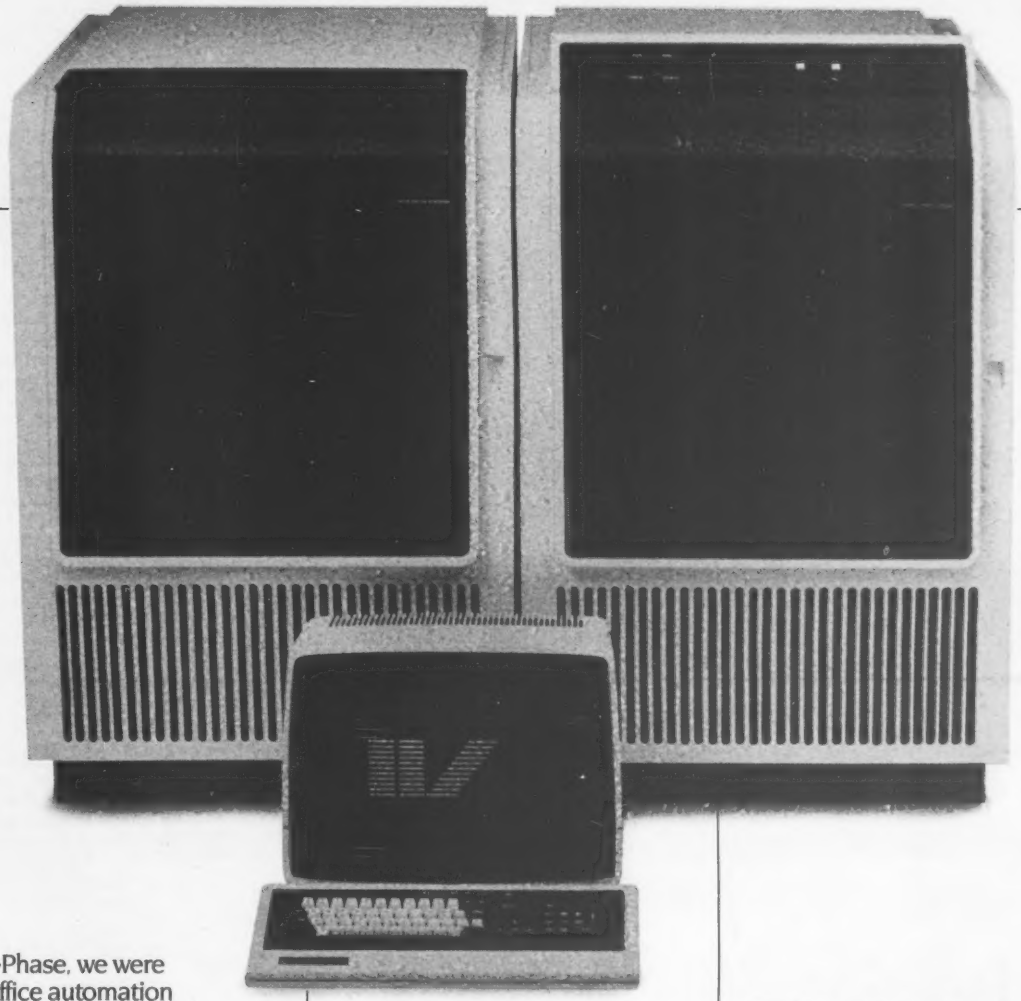

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Office Automation Company.™

venture into the world of computers with little understanding of how they should be used.

This uncontrolled purchasing of computers does not necessarily have an initial bad effect on the company, but that may change after the new breed of manager-cum-computerist comes of age.

Many corporate managers purchase their first personal computers to run Visicorp's Visicalc or similar electronic spread-sheet programs. Sometimes, an initial purchase will also include a popular word processing package.

The executive has not considered who else in the corporation needs the same information and how that information will find its way into their hands.

This manager must understand that the diskettes from his Apple II won't work in the Xerox Corp. word processor at the secretary's desk, nor are they compatible with his boss' IBM Personal Computer. If he starts a task on the Apple, it cannot be delegated.

Some secretaries find this a delightfully democratizing experience; some managers curse the mental myopia they suffered when making their decision to purchase.

Up to this point, the functions performed on the computer are largely ones which otherwise would have been done manually, sometimes with the help of a support person. As managers become more at ease with the new microcomputer they've bought, however, they begin to seek new uses for it.

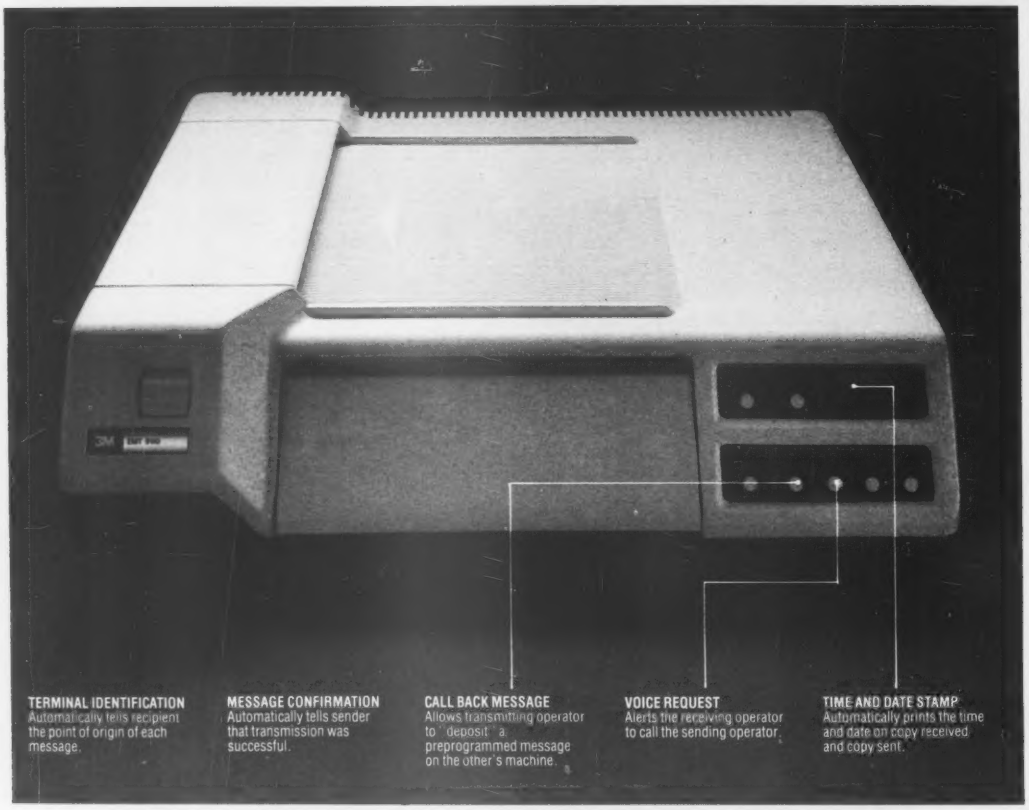
Picture this scenario: Joseph Smith is a marketing executive in a large manufacturing firm. A new product introduction in his line precipitates different, more complicated DP needs. Smith meets with the DP people, who say, "These changes will require an entirely new program and cost your department $10,000. And, by the way, we're in the middle of a project we can't stop. We can't have this new program up and running for at least four or five months."

Smith is not a bit upset that the DP folks cannot give him precisely what he wants. He's always wanted exacting control over what information he can have, in what format and when. He wants to reduce his computing budget and he wouldn't mind being known as the "computerist" of the marketing group.

Smith calls up a golf buddy whose daughter is a computer science student. She writes a program in a week; it runs beautifully. Smith is ready to move the department from downtown Buffalo to the Isle of Utopia.

Don't call the moving trucks yet, Joe! Smith has made a mistake which is frighteningly common in large corporations these days. It is likely that Smith and his subordinates would have no problem with the system he has developed. He has neglected, however, to consider who else in the corporation needs the same current information and how that information will find its way into their hands.

What Smith (and probably his colleagues in other departments) has done is to start an unorganized collection of mini data bases throughout the organization. The data processing people are unaware of the existence of these data bases and are, therefore, unable to use their resources.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MESSAGE CONFIRMATION
Automatically tells sender that transmission was successful.
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Allows transmitting operator to "deposit" a preprogrammed message on the other's machine.
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Alerts the receiving operator to call the sending operator.
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The EMT 9140 results from a massive French/American joint effort. It offers advanced features such as time and date stamp, terminal identification, message confirmation, voice request and callback message. It can communicate with any Group II or III terminal, automatically. It's upgradable and can handle character-to-fax printing and is the first videotex compatible facsimile terminal. And again, its costs of rental and operation are low enough to let you abandon analog altogether.

Find out more about 3M's new EMT 9140 and the entire network of 3M electronic message terminals. Call 1-800-328-1684 toll-free. (In Minnesota, call 1-800-792-1072.) Or mail the coupon to: 3M Business Communications Products Division, Department BC81-17, P.O. Box 33600, St. Paul, MN 55133.

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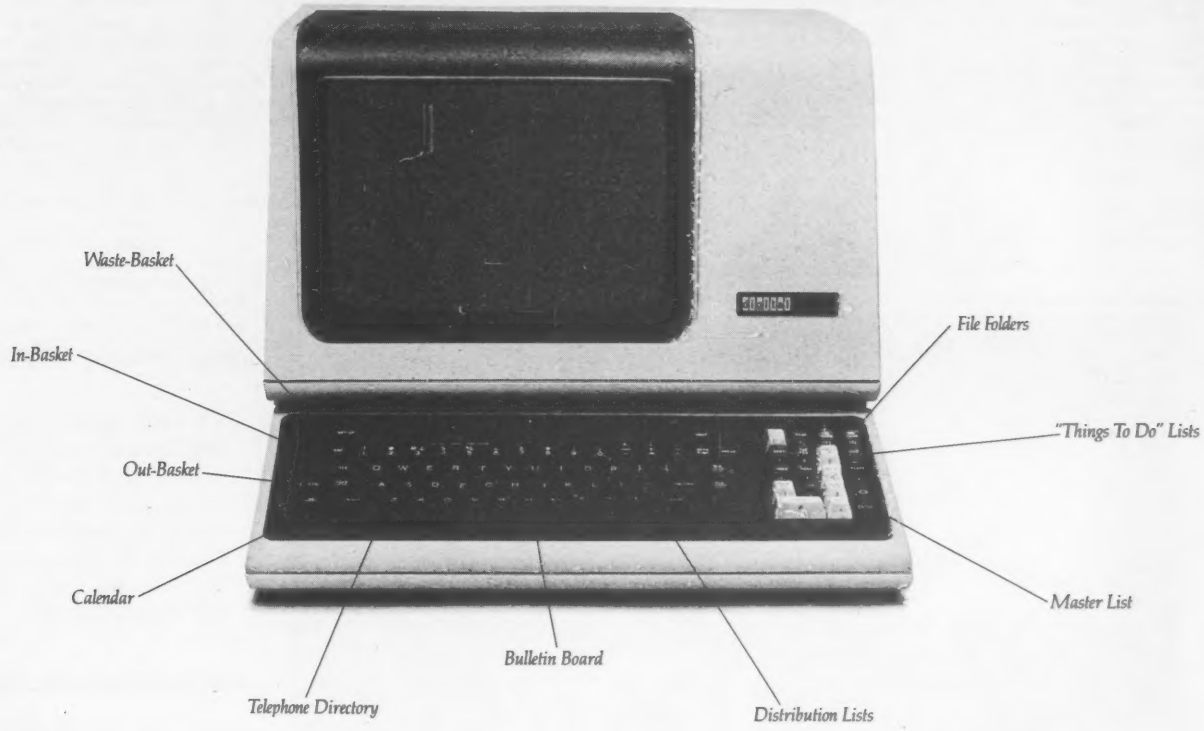

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Is there more than electronic mail?

There certainly is. Digital is taking a comprehensive approach to office information management. The aim is to help you make your job as productive and enjoyable as possible. Our systems are designed to meet the needs of any office, large or small, with state-of-the-art word processing (both stand-alone and shared), interactive data processing, text management, and the most advanced networking capabilities available anywhere. And these functions can be accessed through a single multi-function terminal.

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Of course, if you feel you simply can't part with the desk that's served you so well in the past, don't worry. This terminal will fit very nicely, right on top of it.

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digital

This creates an imbroglio of vast proportions, resulting in duplication of the data stored on personal computer media as well as problems in keeping all of the data current.

Potential implications of this situation are obvious and represent both a headache for the DP manager and quantum drops in the overall efficiency of the organization.

The data base management problem is not the only one companies are encountering with the uncontrolled use of personal computers. There are other major problems DP departments regularly address but that are not often addressed by the personal computerist. The two major ones are backup of storage media and security.

The manager of widget sales is totally unaware that copies of current files for the mainframe computer are regularly sent to an off-site vault for storage in case of fire or other disasters. His are stored in his desk, perhaps sometimes even carried with him and subject to every disaster from coffee spills to potential mishandling at the hands of airline baggage handlers. While the storage media for the mainframe are protected by a security guard, two cardkeys and a password, his are accessible to anyone with a crowbar to open his desk.

The naivete of the novitiate personal computer owner frequently precludes even a knowledge of these precautions. Neither do the Joe Smiths of the world realize that, while one application they submit to DP is expensive and time-consuming since it requires the creation of new programs and data bases, existing programs often can be modified to address their needs. This is where the real cost-saving occurs.

The preceding may seem like a diatribe against the use of microcomputers in a corporate setting; it is not. Many industry analysts have predicted a slow, steady decrease in sales of mainframes and large minis because of the introduction of personal computers. Their assertion is probably accurate. The personal computer does have a place in tomorrow's office, albeit not as described above.

The power of the computer must be available to everyone in the office. Today, the personal computer is essentially a standalone unit. There are a number of uses for communications options. Most, as they exist today, are cumbersome and difficult for the executive to master. Users of commercial "telecomputing" services, such as The Source, often purchase the service for only one application (such as stock quotes and electronic mail) and don't bother to use others.

The key to efficient use of the microcomputer in today's office lies in the guidance, management and education that will undoubtedly come from the data processing department. DP managers must acknowledge that micros exist and that they are being purchased by managers in the organization.

They must take the initiative in educating these managers as to what applications can be effectively implemented on their computers and also point out those applications that are unrealistic at the micro level. DP managers must work toward acquisition policies that will help users avoid the more common pitfalls associated with random acquisition and implementation of microcomputers.

Tomorrow's office will see a standardization emerging. Microcomputers must be a part of the "system" to be effective. They must be easily and directly connectible to local-area networks. There must be a level of file compatibility at least equal to that which currently exists on larger computers.

The personal computer in tomorrow's office must be a truly multifunctional (and, as one vendor says, ubiquitous) workstation. Fortunately, the industry is beginning to recognize and address these issues. OA

The key to efficient office use of the micro lies in the guidance, management and education that will undoubtedly come from the DP department.

Vogel is a staff consultant with The Office Systems Consulting Group in Boston and managing editor of its monthly newsletter "Automated Office Systems." ♦

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CAN DOWNTURN BE HALTED?

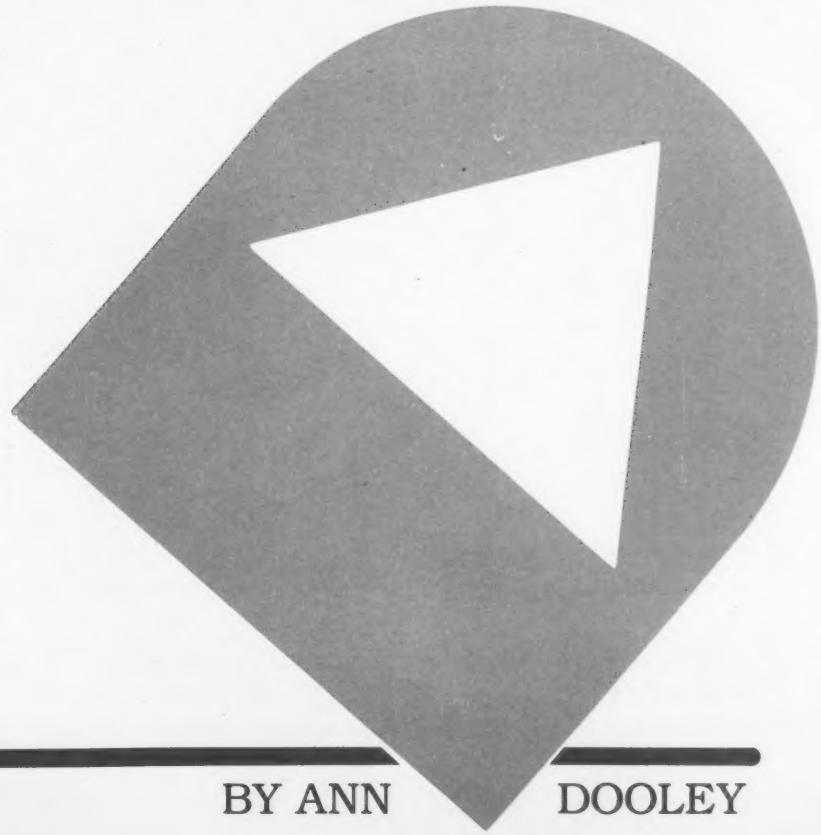
High Hopes For Datapoint?

How did a company that seemingly holds as many pieces to the integrated office as Datapoint Corp. end up in its present precarious condition?

Until recently the darling of Wall Street, Datapoint is finding itself beset by falling stock earnings on the one hand and increasing attacks concerning the strength of its product line on the other, all at a time when competition is heating up in general.

Datapoint began offering many of today's hot office technologies before most other vendors ever thought about the office as a market. Until its recent fall from grace, the San Antonio, Texas-based company was considered particularly well managed and, especially for its size, a dependable company with a good product line. Now, the company is struggling to repair its blemished reputation, avoid slippage in its present customer base and continue to attract new sales.

Datapoint's problems became apparent when its stock plummeted by more than 30% in the second quarter of this year, after an announcement only a few weeks earlier that it would meet its projected earnings. The reversal was due to orders from unshippable business, according to Datapoint, either from customers under recessionary



BY ANN DOOLEY

pressures or because of its own shipping delays. The investment community, which previously had considered Datapoint a high flier with its 39 consecutive quarters of profit, began to look at the company with a more jaundiced eye, which, according to Gerard Cullen, vice-president of marketing, only aggravated the problem.

Datapoint has had a long-standing philosophy of fiscal conservatism, expensing its research and development and maintaining a relatively debt-free status. But in order to maintain its high rate of earnings, "tremendous pressure" was put on the sales staff, Cullen admitted. Although claiming that the recession compounded stalled orders, he acknowledged a "general company fault" in exerting the pressure. As a result, sales on products were recorded months in advance of payment or, at times, even before the equipment had been manufactured in order that the sales figures would appear on the books.

Datapoint decided to clean house last month, hoping to gain back the good will of the financial community and also to reassure its customer base. The housecleaning included a voluntary audit and accepting the resignation of five top sales executives.

"This is a significant problem for Datapoint," according to Marc Schulman, vice-president and analyst at First Boston Corp. The company is in the unfortunate position of having its reputation being given a black eye, and reputation matters a lot in the industry. Attracting new customers will be difficult, he said, adding that he knew of one large Datapoint user that had just made the decision to go with another vendor. "It may even be advisable for the company to deemphasize OA and go back to its good old product line for awhile," Schulman said.

The financial stability of a company is becoming increasingly important in customers' minds, OA consultant Thomas Billadeau agreed. Because users want to make sure a company will be there for the long term, finances are being scrutinized more closely, but they aren't necessarily being adequately explained to people, Billadeau noted.

It is too early to tell how large an impact is actually being made on sales or how many current customers are rethinking their purchase decisions.

Cullen agreed time will be needed to heal the company's current state of affairs. "We can't do anything but keep going. I can't announce a magic product that would make everything right. However, we're committed to keeping our heads down and working." The company's present customers are committed, there is no intention to cut back on R&D or field service and Datapoint is a solid company, he asserted.

"It's not the facts that are bringing us to attention, it's the rumors. We consider our reputation a precious thing and it's being hurt," Cullen complained. Morale is high, he said; the company has weathered hard times before and survived. "People said you couldn't build a computer company in San Antonio, but we showed them we could."

Datapoint decided to begin merchandising its product line to the OA market by billing itself, if not the leader in office automation, at least one of the pioneers. Now, Cullen indicated that if he could turn the clock back, he might reconsider. "We left a really good user perception on the table." The company came into office automation through its foundation in dispersed processing, an area in which it was well established.

Datapoint's OA marketing strategy is that networking is the hub of the product line with features being added as the user requests them. Datapoint is realizing, however, that many users are hesi-

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tant about endorsing the global, integrated workstation concept as a starting point and would rather begin with something simple like stand-alone word processing — an application Datapoint has never concentrated on.

Observers agree that focusing on the entire system and not on its individual pieces may be working against the company. According to David Terrie, senior analyst in office automation at International Data Corp., one problem Datapoint faces is being seen as not excelling in any one thing.

"No one beats the breadth of Datapoint's product line, but that doesn't say anthing about the strength of the individual pieces." They do an "awful lot of things right for a company that's taken such a beating," Terrie said. "They have the kind of system everyone is trying to put together."

Cullen is aware of the difficulty in articulating current marketing philosophy. Despite the criticism, Datapoint considers its distributed computer power and networking to be its strongest assets. Cullen admitted Datapoint is weakest in the area of user-friendliness, particularly regarding the ease of installation and maintenance required by non-technical office personnel. But that's the kind of thing that can be fixed, he said and noted that Datapoint is over the hurdle of integration and can now go back and improve individual functions. Datapoint officially entered the market in November of 1979, when it introduced its Integrated Electronic Office (IEO), which reportedly links DP, WP, mail and communications capabilities around a common data base. The company offers the additional capability of two networking technologies: either coaxial cable through its Attached Resource Computer (ARC) network or digital switching through its Information Switching Exchange (ISX).

ARC, introduced in 1977 and with an installed base of 2,000 users, expands into an IEO system through the addition of WP and electronic mail software modules. It is compatible with all of the company's hardware, software and various telephone communications facilities, including the Infoswitch communications management system.

The firm also introduced color business graphics, a high-quality laser printer and a facsimile communications interface last year.

Datapoint is making public its ARC local-area network specifications, a decision made by the company after being "swamped" by requests following its agreement with Tandy Corp. giving that firm the right to link ARC with its Radio Shack TRS-80 II microcomputers. ARC never received the attention it deserved, according to Cullen, who said it is the only network that can be connected and reconnected while the network is operating.

Regarding other technologies, Datapoint's Resource Management System operating system, in its second year of installation, has received some complaints from users, but Cullen claimed that most are from overly high expectations on the part of users. A number of projects are also under development concerning gate arrays and large-scale integration technology, Cullen said.

Apparently, Datapoint will not include any new kinds of products in near-term development. This may prove to be a major mistake for the company, according to some observers. The company's 8086 and 8088 processors are their only 16-bit machines, while all their other equipment is based on 8-bit processors. That's not even taking into account that many companies are moving to 32-bit processors, First Boston's Schulman maintained. The company needs a thorough restructuring of its product line, he said, and the absence of any significant products will slow growth even more.

As news of Datapoint's financial woes continue, rumors of acquisition have spread among industry followers, who do note, however, that it would be an unlikely event until the company's financial position has cleared. The most likely candidate is rumored to be Tandy, but both parties deny the possibility. A Tandy spokesman stated, "Rumors are going around that Tandy may acquire Datapoint, Motorola and Braniff, and all are viewed with equal incredulity."

Looking at the competition in the OA marketplace, Cullen sees Wang Laboratories, Inc. and IBM as Datapoint's major targets. Because of its WP background, Wang is the prime competitor, but Cullen maintained that Wang does not have Datapoint's system interchangeability. Against IBM, Datapoint's tactics are to combat the mainframe giant with greater flexibility and interchangeability plus lower cost.

What's in store for Datapoint? It's almost anybody's guess. OA

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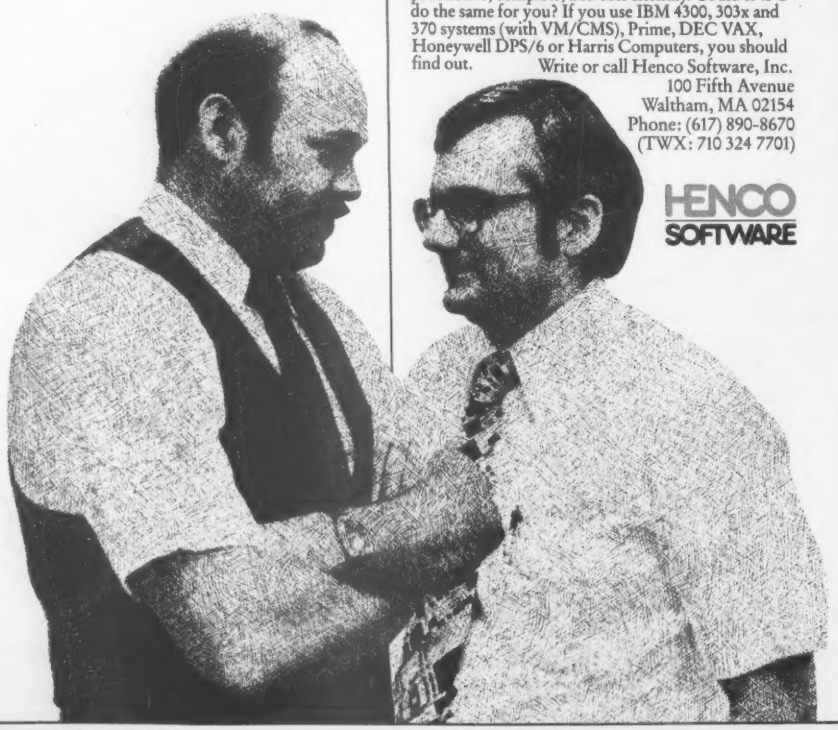

ENTER THE CRT TERMINAL

Redesigning The Office

Wherever you go, whatever you do, chances are you will interact with a computer terminal at some point during the day. From newspapers to airlines, video arcades to offices, CRT terminals are changing people's work and play habits. For some individuals and applications, the transition to this new technology has been fairly smooth; for other applications, — many of which are in the office, — the transition is anything but smooth.

Why should the office environment be so ill-equipped to deal with CRT terminals?

If one were to examine an office from the era of the Civil War and compare it to one from the 1960s, there would be more similarity than difference between the two — both were centered around the task of moving paper-based information. Certainly, changes have occurred: the typewriter, the telephone, the photocopier. Yet paper remained the basic information medium.

Enter the CRT terminal. A large device, it requires people to input information via a keyboard and to read it from a raised, vertical, reflective screen covered with glowing figures. This fundamental change in information handling has been primarily responsible for the problems and concerns associated with CRT terminals in the office.

With the introduction of CRT terminal systems into its office environment, the State Farm Insurance Companies became aware of certain shortcomings of existing workstations and work places in

BY T.J. SPRINGER

With the introduction of CRT terminals, State Farm became aware that existing workstations and work places did not meet employees' needs. A four-phase program of research was inaugurated.

accommodating employees' needs. In order to address systematically the issues of concern associated with CRT terminal use, a program of research was inaugurated.

To determine how CRT terminals affect workers and work places, employees were asked to provide feedback both before and after they began to work with terminals. Questions regarding the furniture, lighting, noise, privacy, training received, satisfaction with co-workers, supervisors, job and terminal system were asked by means of a survey questionnaire. Interviews of a selected group of employees were also conducted.

Increased dissatisfaction with chair comfort, drawer storage, amount of work surface and increased reports of glare, physical discomfort and nervous tension were reported following the introduction of the terminals. Eyeglass wearers, especially bifocal wearers, had to assume extremely fatiguing postures, tilting their heads backward and leaning forward to focus on the CRT terminal screens through the lower lens of their eyeglasses.

To better understand the situation as it existed, several representative workstations were studied in detail. Information regarding storage, placement of "tools," work flow, position of workstation elements, illumination and amount and frequency of work received was recorded. This data was used to make improvements to existing workstations.

However, basic shortcomings still existed. Consequently, the U.S. furniture marketplace was surveyed for alternatives that would better meet the needs of CRT terminal users. Unfortunately, very little was available in 1979. In an attempt to generate interest and discussion among furniture and computer manufacturers, a statement of requirements was published and distributed to 10 major furniture companies and five CRT terminal manufacturers. This document met with considerable interest; however, few of the recipients were in a position to respond to

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1. Worker Attitude Survey
2. Worker Interviews
3. Work Space Use Survey
4. Market Survey
5. Statement of Requirements

II: Development of Design (1980)

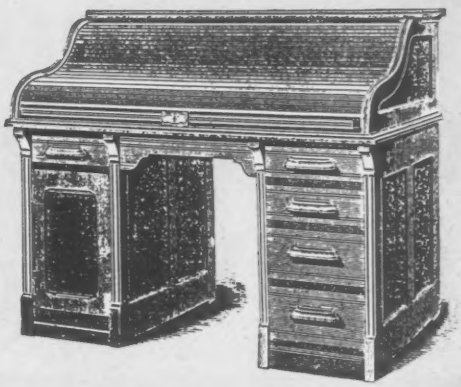
1. Request for Proposal
2. Evaluation of Equipment Drawings
3. Scale Model Building
4. Floor Plan Evaluation

III: Simulation, Operational Testing (1981)

1. Prototype Fabrication
2. Simulation Development
3. Functional Evaluation
4. User Attitude Survey
5. Requirements Verification

IV: Field Test (Proposed, 1982)

1. Development of Training Program
2. Selective Implementation
3. Field Observation
4. Worker Attitude Survey
5. Worker Interviews



stated needs. During 1980 the second stage of the research program began. Realizing that the statement of requirements may not have been specific enough, State Farm published a detailed list of workstation specifications, a suggested design and a request for proposals (RFP). This information was also disseminated among the furniture manufacturers.

Four out of 10 firms responded with detailed drawings. Of these, two were rejected as not meeting the stated specifications. The remaining two workstations' designs were then used to build one-twelfth-scale models. These models were evaluated in terms of efficiency of work surface design, floor space utilization and other facility management issues. Only one of these workstations survived this step of the evaluation.

At approximately the same time as the scale-model evaluation, State Farm expanded its search for CRT terminal workstations to include European products available in North America. Two workstations were found which appeared to meet many of the requirements and specifications included in the published documents.

In addition, unsolicited contact was made by a major U.S. firm that had entered the CRT terminal workstation arena. This company's design was examined and found to be suitable for inclusion in further evaluations.

Phase three of the research program began early in 1981. Full-scale models of the four selected workstations were acquired. Each workstation consisted of a chair, writing surface, storage unit and terminal stand. In order to conduct meaningful, controlled comparisons among workstations, an office simulation laboratory was developed.

The basic idea in simulation testing is to re-create under controlled conditions a setting that is as identical as possible to the "real world" setting. Consequently, the simulation testing area duplicated the computer system, CRT terminals, noise, light, temperature and job tasks found in State Farm regional offices. Each new workstation was compared with every other one and with the existing company standard work-

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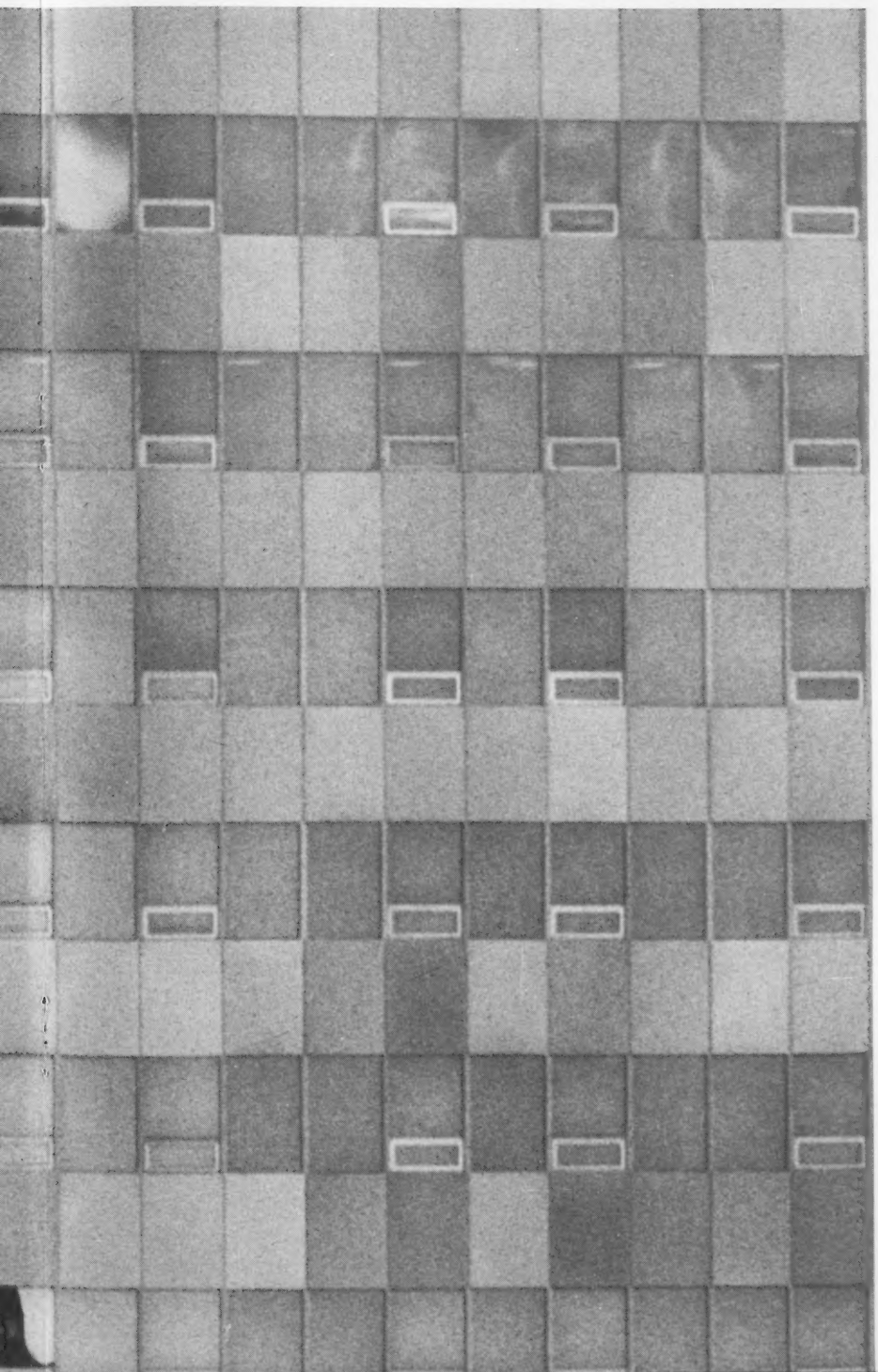

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station under identical conditions. In so doing, it was possible to make inferences about:

- The impact of workstation design on performance.
- The impact of workstation design on attitudes.
- The impact of seating on attitudes and performance.
- The workstation characteristics of greatest importance to employees.
- Ranges of adjustments necessary to accommodate varying employee physical requirements.

Information collected during this phase included performance data (time to complete transaction), employee attitudes and employee and workstation physical dimensions.

The results of this portion of the research indicated:

☐ Two of the new workstations, one U.S., one European, resulted in significant improvements in performance (10% to 15%).

☐ Employees showed a strong preference for those workstations that provided independent, user-operated adjustments to the height, distance and angle of both the display screen and the keyboard.

☐ Preferred chairs were those that provided contoured seat and back-rest surfaces and easily operated adjustments to seat height, back-rest height and back-rest angle.

☐ Employees felt the most important workstation characteristics were comfort, ability to adjust their own furniture, position adjustments of chair elements, writing surface, keyboard surface and terminal screen support surface.

☐ A wide range of adjustments were observed during the course of the evaluation. Employees ranged in stature from 58 to 76 inches. Observed ranges of equipment positions indicated that seat height ranged from 16 to 24 inches, keyboard surface height ranged from 24 to 31 inches, terminal screen-support surface height ranged from 24 to 32 inches and viewing distance ranged from 16 to 24 inches.

Based on the results of the equipment evaluation, the general requirements of a CRT terminal workstation at State Farm are:

- A freestanding desk with terminal stand positioned adjacent to the primary writing surface at an angle that enhances efficiency of motion between work surfaces.
- The ability to add components to accommodate right- or left-handed users and varying needs for work surface and storage.
- Maintenance adjustment of writing surface height.
- Independent, employee operated adjustment of terminal screen and keyboard support-surface height, angle and distance.
- Auxiliary work surfaces on either or both sides of the CRT terminal.
- Pedestal drawers and shelf storage units.
- A suitable chair offering contoured seat and back rest as well as easily operated, employee-controlled adjustment of seat height, back-rest height and back-rest angle.

The final phase of the research program is under way. Several field locations have been identified, and selected workstations are being installed. Training materials, which are critical to the success of any new system, are being pretested. The field test is anticipated to continue through the third quarter of 1982, at which time user reactions, performance data, ranges and frequency of furniture adjustments and cost data will be used to make a final purchase recommendation.

It must be noted that the workstation is only one of several crucial elements involved in determining the efficiency and comfort of CRT terminal operators. Lighting, illumination and glare are critical concerns. Attention must also be focused on the viewing requirements of eyeglass wearers, work-rest intervals for users, adequacy of job design, noise levels, privacy and a host of additional concerns.

Each location and each job is in some way unique. Thus, in focusing attention on the problems and possible solutions of CRT terminal applications, it is imperative to remember the single most valuable and expensive element of the work place is the human operator.

Although many fine examples of high-quality, empirically based research do exist, it has been State Farm's experience that many guidelines and recommendations are not supported by data, do not transfer directly from Europe to the U.S. and should be examined critically. Those implementing systems should guard against acceptance on faith, exercise healthy skepticism, resist the temptation to apply quick fixes or band-aid solutions and cooperate with one another in resolving the problems of office automation. OA

Specializing in human factors, Springer is associate research administrator in the corporate research department at State Farm Mutual, Bloomington, Ill.

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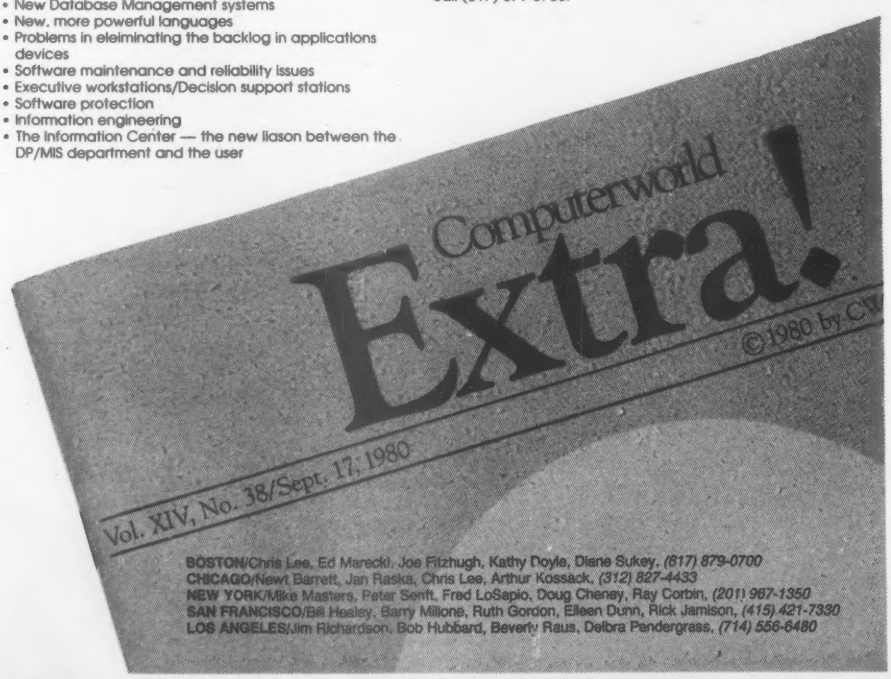
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INTEGRATION IS THE KEY

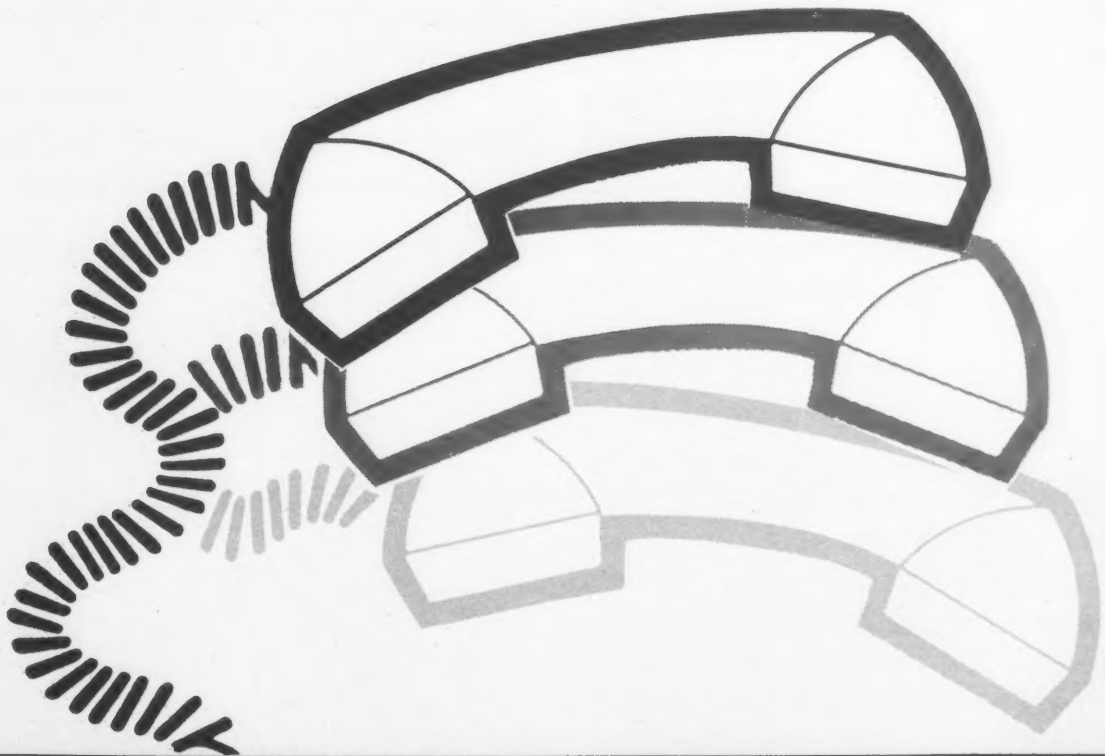
PBX

More and more companies are trying to choose between local-area networks and private branch exchange (PBX) technology to handle their communications needs — both intraoffice and interoffice. Users find themselves planning today for tomorrow's telecommunications needs. As they plan, they must also try to determine the role PBX will play in that future environment.

The corporation's communications environment typically has been a telephone network that supported in-house and external calls by means of a PBX. As data communications needs grew, data networks evolved in parallel with conventional voice networks (see Figure 1 on Page 42).

Although some sharing of facilities occurred — such as Full Business Day Wats lines for voice and lower speed data transmission (300 to 1,200 bit/sec) — it was not true voice/data integration.

The current trend is toward integration of voice and data within the same structure, which will include such services as FAX, video teleconferencing and communicating word processors. The integrated network approach carries a major benefit: it can adapt more easily to new



BY SUSAN ROSENZWEIG DRAKE

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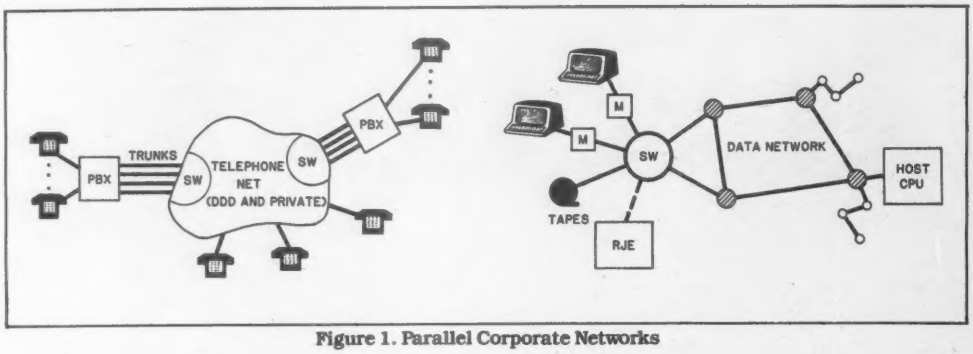

Figure 1. Parallel Corporate Networks

technology and applications (see Figure 2). It provides a uniform way of dealing with total corporate communications requirements, and it can result in significant savings through economies of scale.

In response to this trend, a few PBX manufacturers have introduced "third-generation" integrated switches. In the next few years, new vendors and new products will appear. The innovators in today's third-generation marketplace — Intecom, Inc, Lexar Corp. and Datapoint Corp. — hope that by being first, they will dominate the market in the 1980s.

Second-generation switch manufacturers like Rolm Corp., Northern Telecom, Inc. and GTE are enhancing their digital switches with integrated voice/data packages to address this trend. All major switch manufacturers probably are planning to or soon will introduce data packages. In addition, office products companies like IBM, Xerox Corp. and Wang Laboratories, Inc. could, in the future, offer "super switches." These switches would fully integrate the office automation environment in which those vendors now have market position and high levels of expertise.

I will not attempt a detailed technical comparison of available PBXs, but I feel it is important to discuss salient aspects of these switches. Currently available third-generation switches offer similar capabilities:

- Distributed switching architecture with stored-program control.
- Reduced-pair station wiring providing for both voice and data transmission.
- Nonblocking switching (although some switches appear to be traffic-sensitive).
- Synchronous and asynchronous data communications up to 56K bit/sec.
- Modemless switching for data communications within a building and modem pooling for data communications requiring access to data devices outside of a building.
- Simultaneous voice and data transmission.

In addition, the Intecom IBX offers various format conversion and protocol translation capabilities.

The Northern Telecom SL-1, through its Integrated Voice/Data Switching (IVDS) offering, and the Rolm CBX, through its Release 7

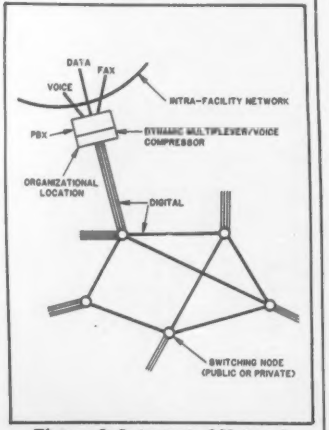

Figure 2. Integrated Network

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Data Communications Feature (DCF) software, can offer asynchronous data speeds up to 9,600 bit/sec and 19.2K bit/sec respectively. Each can switch data and voice simultaneously and can provide for modem pooling. Both are apparently more traffic-sensitive than the third-generation switches. The value of the data transmission rates is questionable because most available asynchronous data terminals do not exceed speeds of 1,200 bit/sec.

The once raging analog-vs.-digital issue has been supplanted by the data transmission speed issue. Should a company select a PBX that will support 9,600-, 19.2K-, 56K- or 64K-bit data speeds? The transmission speed debate assumes the PBX is the communication vehicle supporting OA requirements within a facility. What are the other alternatives for users? Four intraoffice systems can be considered, each of which would provide a gateway to outside facilities:

The once-raging analog-vs.-digital issue has currently been supplanted by the data transmission speed issue. Should a company select a PBX to support 9,600-, 19.2K-, 56K- or 64K-bit data speeds?

Stand Alones — PBX and Data Switches: The PBX can be a first-generation switch for plain old telephone service or it can be a second-generation switch without data communications enhancement. The PBX can support low-speed data transmission, but cannot provide for simultaneous voice/data transmission from an integrated workstation. To support data transmission, a stand-alone data switch would be provided.

Although the data switch can offer 19.2K bit/sec or higher port speeds and fast call setup or packet switching, there may be negative financial tradeoffs with two separate switches. In addition, this alternative is counter to the present trend toward voice/data integration. It forms the basis of the parallel corporate networks depicted in Figure 1 on Page 42.

If corporate data communications requirements are truly major, such specialized support may still be appropriate. It will be less appropriate as capabilities for integration evolve.

Integrated PBX: The computerized, integrated PBX can be either a second-generation switch with a data enhancement package or a third-generation switch. The major advantages of using a PBX are:

- It can provide for a large number of simultaneous conversations.
- It provides for ready access to cabling at user locations.
- It allows simultaneous transmission of voice and data.
- Third-generation switches now provide data rates suitable for many OA applications.

Major disadvantages are:

- The cost is presently high (up to $1,200 per port).
- It is potentially inadequate, depending upon application of traffic-carrying capability of call processing speed and of available bandwidth.
- A potential for future facilities contention exists if the PBX will have to serve growing local PBX needs (additional extensions, lines and so on) and expanding OA requirements. The need to provide local telephone service to users might detract from and limit new OA applications.

Local-Area Networks: A local-area network is a transmission medium (coaxial cable, fiber-optic cable) for terminals and hosts closely located within a single facility or nearby facilities. Local-area networks are characterized by high bandwidth, low error rates, strong connectivity and the ability to easily address distances from several hundred feet up to a few miles. The ideal local-area network would allow for multimedia interfacing, allow total connectivity between users of a service and be capable of interfacing with equipment or systems supplied by multiple vendors.

High speed and large capacity could make the local-area network a formidable contender in providing the telecommunications capability for the automated of-

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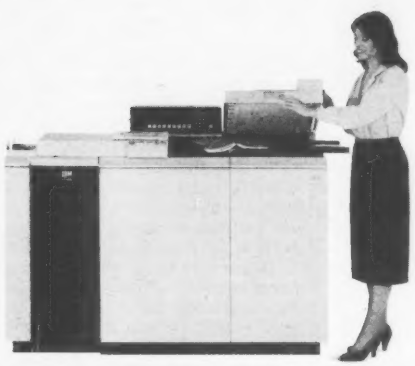

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fice. However, it is a fairly new technology and falls short of the ideal capabilities described above.

Local-area networks do not easily adapt to voice traffic. Without the introduction of additional equipment, they are unable to furnish required PBX voice features. Although it is now technically feasible to switch voice via a local-area network, conventional PBXs are able to provide better voice quality at lower cost. Local-area networks appear most beneficial when traffic volumes are high and real-time communications requirements exist.

Combined PBX and Local-Area Network: Figure 3 on Page 45 shows a model of a possible combined setup. In the case shown, the PBX would interface directly with the local-area network to provide a communications link between telephone stations and other devices (it is assumed these communications requirements would not be high). The figure also portrays the PBX acting as the gateway to external networks and/or facilities. Both scenarios are technologically feasible and reasonable.

Should local-area networks really take off in the next two to five years, the PBX manufacturer that provides for direct station/local-area network interface will have a big jump on the competition.

It is important to note that the interface to the local-area network is provided via the switching vehicle, not the PBX station. Today's proliferation of wiring would remain in place and two distinct networks would exist: the local-area network and the PBX. Several leading PBX vendors have informally stated they have no present plans to provide direct PBX station interface to a local-area network. They are betting integrated telephone systems will continue to be the communications nucleus of the office. Should local-area networks really take off in the next two to five years, the PBX manufacturer that provides for direct station/local-area network interface will have a big jump on the competition.

We can expect to see combined PBX and local-area networks when the OA equipment centrally shares logic and storage capability and communicates only occasionally with other office automation facilities that are widely dispersed geographically.

The "future" integrated network is technically feasible now and many of its necessary components already exist. The costs of these components have become low enough to allow large organizations to begin cost-effective implementation.

Companies must ask themselves "Which of the alternatives best suits my short-term and long-term needs?" The firm that begins building its strategy today will be able to take advantage of new evolving technologies.

To understand the role the PBX will play we must understand how voice will be handled by the integrated network. The digitization of voice is closely related to the development of new applications, as well as to the efficient sharing of an integrated voice/data communications structure. Digitized voice can share the same equipment and lines used for data and does not require expensive analog devices and frequency division multiplexers. Various technologies exist for voice digitization at different rates and costs.

With digitized voice, one of two conditions usually applies:

- The digitization technique is more expensive because of the need for voice decoders (vocoders) and transmission cost is low.
- The digitization cost is low (using a PCM encoder), but transmission costs are high.

In the next few years, voice digitization vocoders are expected to provide better transmission quality (less "metallic coloring" and better comprehension) cost-effectively. This should help to promote the rapid proliferation of integrated networks.

However, there are drawbacks associated with the integrated approach. Different traffic types and applications have markedly

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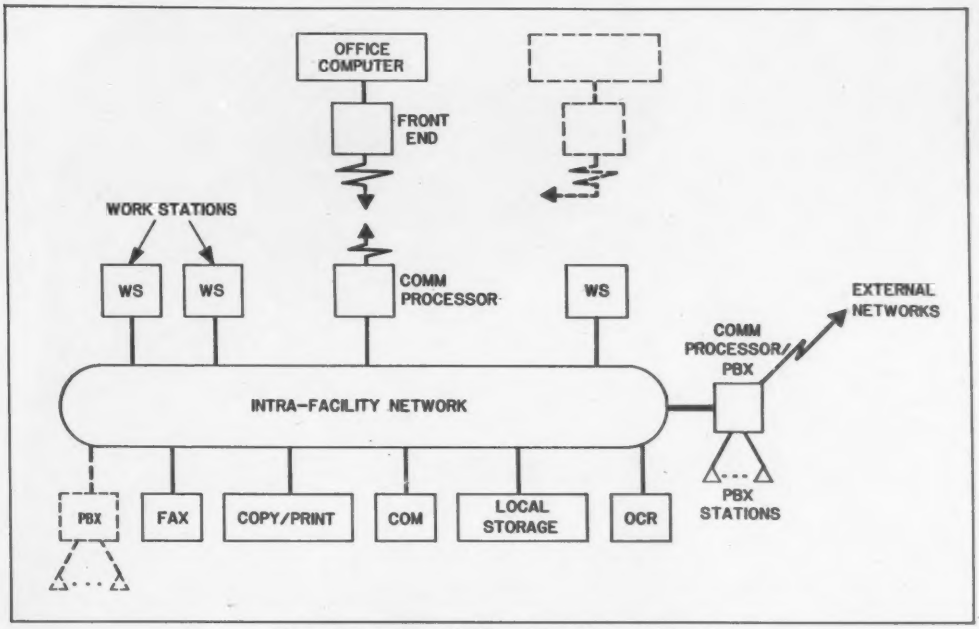

Figure 3. Combined PBX and Local-Area Network

different characteristics and performance constraints. With current technology, some applications use predominantly analog transmission; the data devices therefore need modems to convert digital signals for analog transmission. In terms of performance, voice has to be delivered in an uninterrupted way; a delay of 100 to 200 msec is the most that can be tolerated if conversation is to be intelligible. Interactive systems usually do not have tolerable delay for more than a few seconds. Two-way delay and file transfer, or electronic mail, can wait for hours before delivery. Error control techniques must be imposed over data transmission, but one seldom encounters automatic error detection in digitized voice under PCM technology.

These and other differences indicate full integration of services may require more complex systems. However, despite the potential problems, many experts believe cost-effective integration will be available in the mid to late 1980s.

In order to build a strategy, companies must first determine and quantify existing voice and data applications; this will help to develop the baseline for meeting short-term needs. In addition, future applications such as electronic mail, communicating word processors and teleconferencing must also be identified and quantified.

The results should yield a communications strategy that can be linked to transmission requirements and/or time associated with business growth. It will then be possible to develop a long-term strategic plan to migrate to a type of network and supporting hardware adequate for all planned applications.

Determining a system's useful life is a difficult but necessary part of this process. The integrated PBX now has an inside track in the OA race. Five years ago, the projected life cycle for PBXs was 10-plus years. Today, seven years seems more realistic and many companies are beginning to project five years.

In this time frame, the integrated PBX appears to be the most viable candidate. It is capable of supporting all voice and most conventional nonvoice applications used today.

Today's bandwidth constraints may prohibit some applications, such as full motion video. It is also likely that OA applications and technology that evolve in the future may outstrip the integrated PBX's capability to handle the offered traffic at a suitable data rate in a cost-effective manner.

As local-area-network technology matures and its price decreases, they will undoubtedly become more popular. Today, however, because local-area networks have limited field experience and apparently high price tags, companies are wary of making commitments.

For the 1980s, the integrated PBX will maintain a strong competitive position as an OA telecommunications medium. OA

Susan Rosenzweig Drake is director of Los Angeles operations for the Consulting and Technical Services Division of Contel Information Systems, a consulting firm specializing in data and voice communications and office automation.

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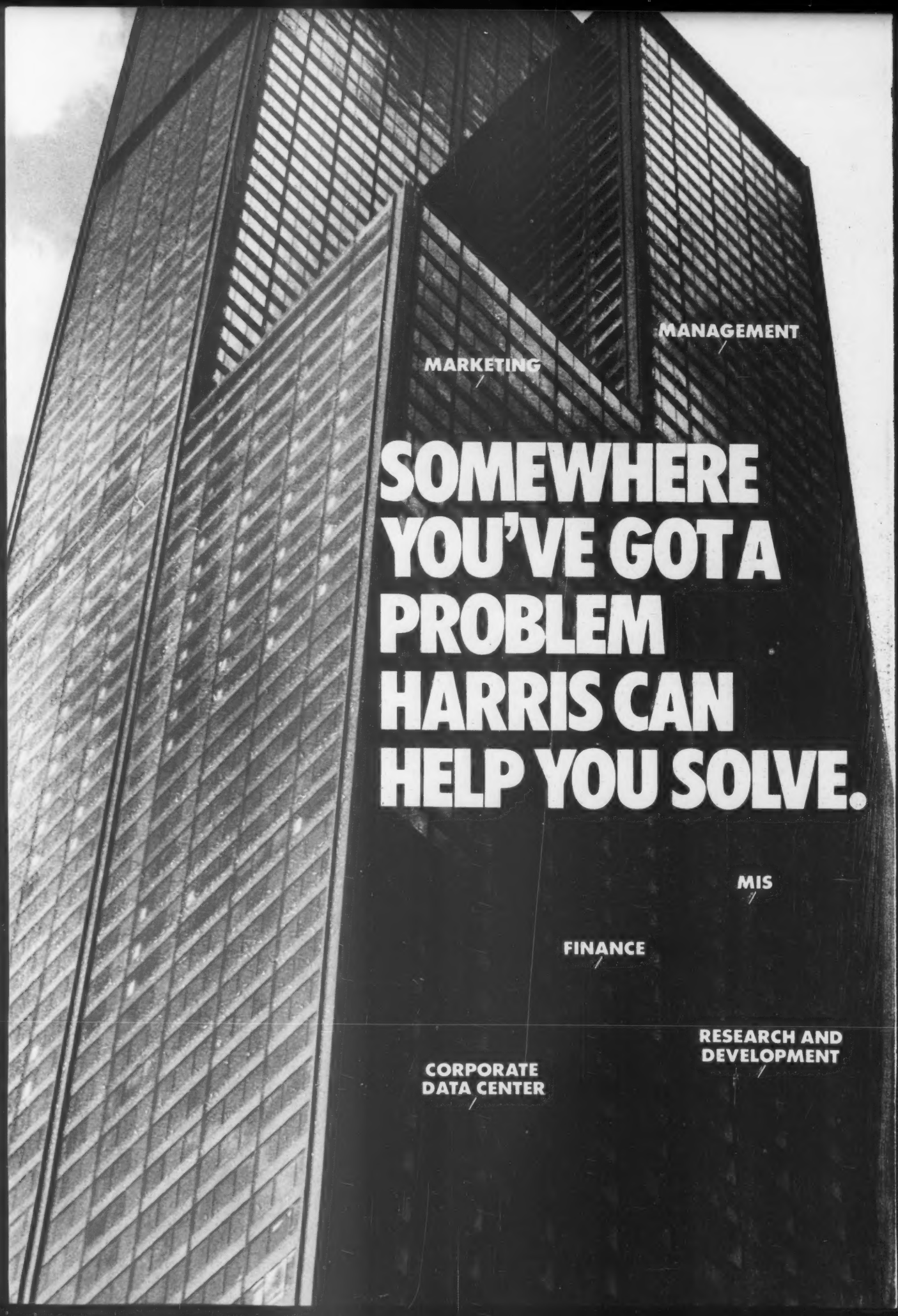
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BY WILLIAM PORTER

Electronic Mail

Many of us dream of a simple installation of a standard system that saves time for executives, managers, salespeople and other professionals. Theoretically, electronic mail can do that. However, a difficulty follows the dreaming stage: there is no standard system to install. There are some parts of systems which are close to standards and there are some items that are not standard at all.

In this article, we will look at the three main parts of an electronic mail system: terminals, central system and connecting medium. The largest units are normally complete computers with some form of interactive program that allows them to act as terminals. Home or personal computers, word processors and some of the more intelligent (complex protocol) terminals fall into this class.

Where will they be used? Some electronic mail systems are meant to increase the efficiency of regular, interoffice communications. This environment is easily supported by large, CRT-based terminals that allow the user to view a complete letter at one time. Letters larger than one screen are available by some form of multiple-page scrolling like that offered on the larger Teletype Corp. and Racal-Milgo, Inc. terminals. Other plans call for expanding the working area supported by electronic mail to include all the places salespeople and executives may travel. This kind of portable processing requires a portable terminal. Some terminals available now are based on a small, one-line display which can be plugged into a printer when the user requires hard copy. When selecting a portable terminal for electronic mail, be sure the terminal will fully support two-way communications. Some devices now on the market are sold as though they were terminals, but are not interactive and will not work for electronic mail applications.

How much power is needed? In an immobile office setting, the amount of power required to operate a terminal is not an overriding consideration. Terminals require about the same power as other office machines. However, portable or home-user terminals should use very little power.

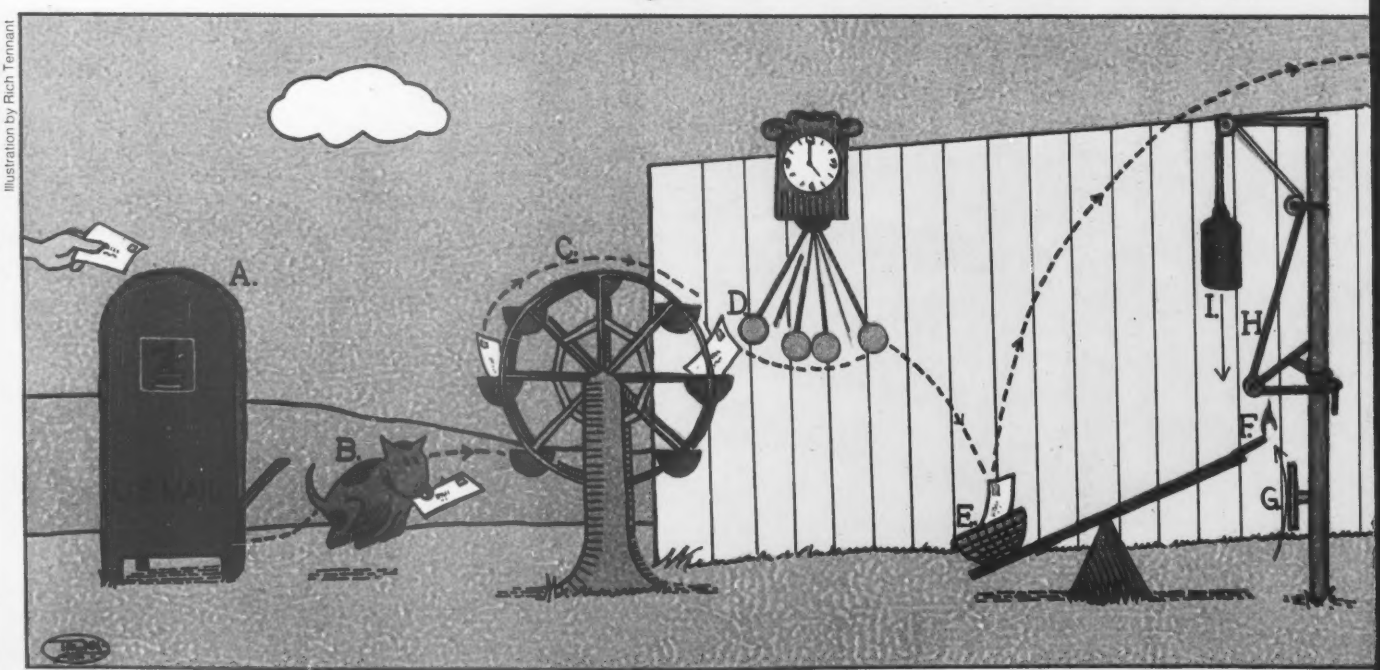
Motel managers, purchasing agents and spouses will be less than enthusiastic about yet another machine that needs 200 or more watts of electricity.

If the portable terminal is likely to see use on an international trip, it must be capable of operating with power sources other than the U.S. standard 110 volt alternating current. Power converters are available for travel to

(Continued on Page 50)

There Must Be

Illustration by Rich Tennant



Letter goes into mailbox **A**, is picked up by near-sighted dog **B** who thinks it's a free pass on toy ferris wheel **C**. Letter is knocked from ferris wheel by clock pendulum **D** into basket **E**. Weight of letter in basket pushes see-saw down striking match attached to opposite end **F** against striker **G** lighting match and burning rope **H** which drops weight **I** onto seesaw, throwing letter into window shade **J** and dropping into wagon **K**. Window shade flys up, pulling attached wagon **K** forward. Boxing glove **L** punches cushion **M** connected

BY WALTER ULRICH

Voice Mail

Great technical advances have occurred to make the telephone more accessible, easier to use and more attractive. Yet, until this decade, the telephone has changed little in its services or usage. Now, voice communications is on the threshhold of a major step forward.

Voice mail is a flexible means of sending a spoken message. The sender speaks into a telephone and the message is stored for later forwarding to its recipient. Because these systems are computer-based, they have powerful message handling and management features which offer considerable benefits.

These voice mail systems are available today and are helping business people improve their productivity and save time and money. However, to understand fully the benefits of voice mail, we must first reexamine traditional methods of using the telephone.

The telephone is so common a part of our daily lives that we have become conditioned to thinking of it as a stable, fixed convenience. We do not imagine how it could be used differently or modified to be more effective. We expect that, like plumbing, it will be available, functional and able to get the job done. As children we learn how to use the telephone and these basic skills are all we need throughout a lifetime.

One common use of the home telephone is to carry out a brief time-critical conversation. The conversation consists of information that needs to be exchanged and acknowledged within a relatively brief period of time and becomes worthless after the deadline passes.

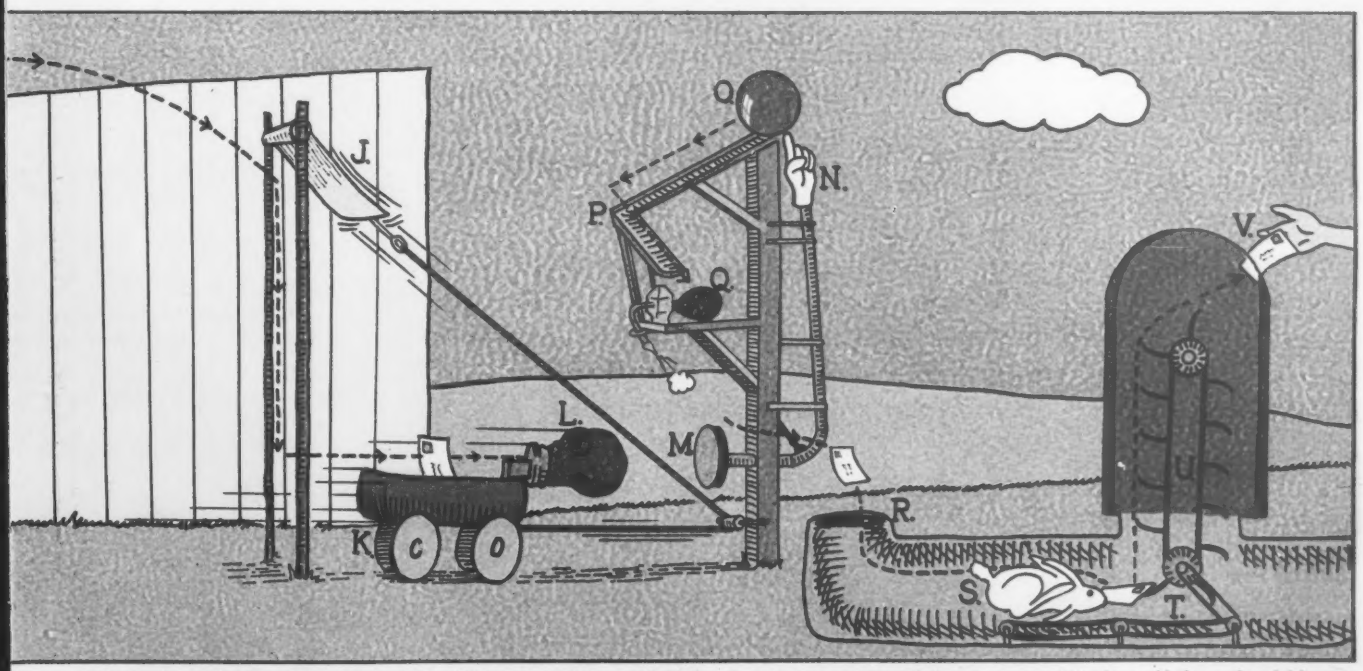
A second type of home telephone conversation is a substitute for a social visit between friends or family members.

We carry these telephone habits into business without any real appreciation for the variety of information exchanges that occur in the office. We misapply our habitual use of the standard telephone by bringing it into an entirely different environment. Both the telephone and our use of it are inappropriate to business situations. This inadvertant misuse is evident from the following systems:

• **Telephone Tag:** The caller, when he is free to make the call, tries to reach someone without knowing whether the called party is available to take the call. Messages are taken and the called party returns the call. The caller position alternates from one principal to the other several times before the two parties connect.

(Continued on Page 52)

A Better Way. . .



to glove with extended finger **N** knocking bowling ball **O** down ramp **P**. Bowling ball falls on atomizer bulb **Q** spraying special carrot scent onto letter and blowing it down rabbit hole **R**. Rabbit **S** smells carrot scent and tries to run away with letter, turning tread-mill **T** which runs conveyor belt **U** which snatches letter from rabbit's mouth and delivers it up into mailbox and opening **V**.

foreign countries. The amount of power the economical and light-weight coverters can provide in a hotel room is considerably less than 100 watts.

What can you do by yourself? Some terminals permit the user to compose a letter entirely off-line. When the letter is letter-perfect, the user can sign on to the electronic mail service, transmit the entire letter at high speed and sign off. The cost of the telephone connection time can be minimized that way. If the terminal is expected to be used from hotels or motels, the telephone charges saved may be significant.

In the office, most problems can be handled by having a patient technician visit anyone having difficulty, but technician time is expensive. Technicians cannot be sent along on every business trip that the electronic mail users take, so the terminals and the electronic mail system must have clear, concise and accurate user manuals.

What special features are required for portable or stationary electronic mail systems?

Semistandard capabilities of terminals include the following features:

Xon/Xoff: Allows the host computer to control the amount of data a buffered terminal sends in one bunch. The computer sends a character to the terminal to cause the terminal to stop sending data for a little while. When the computer is ready for more, it sends another code to cause the terminal to send again.

Answer-back: Allows the terminal to send a canned message to the computer, in response to a canned request, without operator intervention. Some systems restrict access by allowing only terminals with the correct answer-back to begin an electronic mail session.

Break: A break in the communications line is defined as at least one-and-one-half character times of a spacing condition. Some computers use a break to interrupt lengthy reports if the terminal is needed for another activity. Not all terminals support break.

What features do you want in your computer? Most electronic mail systems are also called computer-based message systems, and software is a central requirement. When software is involved, programmers and users keep thinking of wonderful things to add to the system. Whatever system you select should be capable of software updates. Then, when valuable new features are invented, you will have a chance to obtain them for your users. The basic capabilities should allow users to compose and send letters, scan all incoming letters quickly, reply conveniently, save for later, forward to someone else, produce hard copy or destroy the letters.

Beyond these basic features, an advanced feature, natural or symbolic addressing, is also very handy. It is often easier to send letters to a name, nickname or title than to an arbitrary number or address. Good systems will support a list of aliases for each user.

The final important feature is the letter text editor, which should be easy to use for someone with a minimum of typing skills. If it is not simple, the users will not be happy. Remember, the letters sent through the system will tend to be short and pithy. An exotic word processor is not necessary.

Do you want to use your own computer? The least costly way to get electronic mail is to utilize a computer your company already has. Add an electronic mail application package and, maybe, some modems and interface boards to produce an economical

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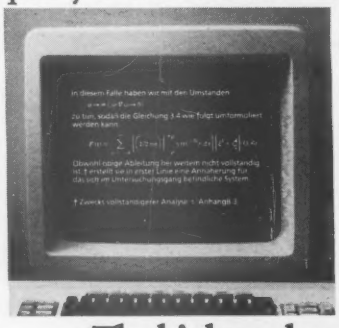
first 400 character d
Because the world is

Until now, if a business needed a printer with a wide range of scientific or multilingual characters, the choices were severely limited. And so was the print quality. Prices for these machines are high. And reliability is low.



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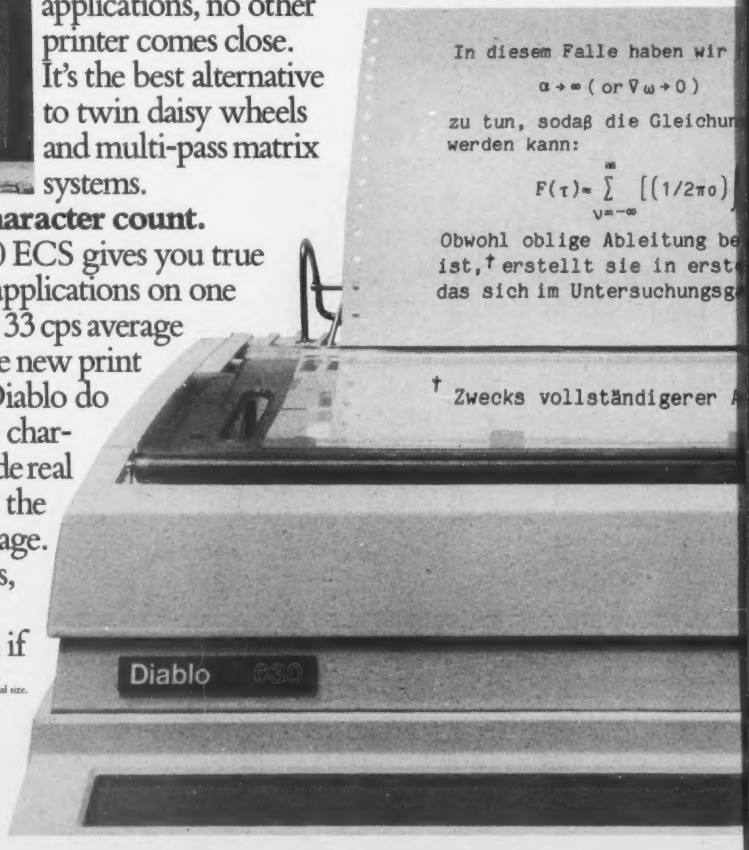

Type shown not actual size.

*Extended Character Set

system. A variety of software vendors sell such packages for most mainframes and established minis.

Do you want a new computer? Another possibility that permits control of the system to remain in-house is to obtain a complete hardware and software electronic mail system from one vendor. These computers are often based on a minicomputer. An advantage is that a single vendor may be more responsive, in times of stress, than two or more vendors, each pointing a finger at the other.

Do you want to use somebody else's computer? Many service bureau-type operations sell an electronic mail capability. In this case, the central computer and software require no start-up capital. With a service, you can also experiment to see if users actually will use electronic mail. Larger vendors will have links through one or more of the national communications networks, which means that all user accesses are local calls.

In all cases, the kind of central system may dictate the kind of terminals you can use. The least costly and widest variety of terminals are asynchronous. If the computer that otherwise looks best requires expensive, intelligent or synchronous terminals, be sure to include the costs of those terminals in your selection criteria.

Just how are all of the terminals hooked up to the central computer? For most electronic mail systems, some form of data communications using voice-grade telephone lines is the medium of choice. These systems are readily available. Office buildings and hotels are already wired into a nationwide network. Most communications can take place over low-speed, 300 bit/sec connections. These connections may be via acoustically or directly coupled modems. Some of the newer modems give you the choice of coupling modes (direct or acoustic), depending on where you happen to be at the time. Be aware that, especially in Washington, D.C., and some rural areas, acoustic coupling may be difficult because of the characteristics of the local telephone service.

Some national carrier networks will allow communications at 1,200 bit/sec. Be careful when choosing 1,200 bit/sec equipment; there are two standards, Bell and Racal-Vadic. The higher speeds may not be easy to justify when the users type at only one or two accurate characters per second. Very few people can read the data as fast as it is transferred on low-speed lines (300 bit/sec or 30 char./sec). No one can read a 1,200 bit/sec data stream.

For high-speed communications, synchronous equipment will fill the bill. Typically, these speeds require dedicated, leased lines. However, you cannot be sure that travelling people will be near such lines at every stop.

Local, in-building or office communications may be accomplished by means of dedicated wiring. Coaxial or other types of cable can be strung all over the building. Terminals are then attached where needed. Most of these private cabling systems require considerable advance planning because stringing new cable to new places for terminals is expensive. Ethernet and some of the other local-networking schemes are designed to reduce the cost of rewiring for configuration changes. These hookups are probably a few years in the future for most offices. OA

Porter is vice-president of programming at Lexicon Corp., Fort Lauderdale, Fla.

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• **Interruptions:** As a courtesy to the calling party, the called person either directly answers the telephone or consents to take the call, even though he is interrupted and inconvenienced. The direct answer places the principal in the position of taking unwanted calls.

• **Incomplete information exchange:** Because of a time pressure to minimize the interruption or because the called person was unable to prepare for the call, important information is miscommunicated or left out.

• **Late information or lost opportunity:** As a result of the difficulty in completing a successful call, information may be too late for full and effective use.

• **Unproductive social exchange:** Since our initial use of telephones is so socially oriented, our business telephone calls are often punctuated by obligatory chit-chat about the spouse and kids, sports and the weather. Although socializing may be suitable in some instances, it is frequently unproductive for a busy executive during a simple information exchange. It wastes time at both ends and increases telephone costs.

Voice mail is a highly productive and cost-effective approach to handle one-way information transfers.

This is where voice mail comes in. Voice mail is a highly productive and cost-effective approach to handle one-way information transfers. It may also be helpful in setting up two-way transfers, which we will discuss later.

Voice mail is the transmission of a voice message to a recipient's voice mailbox and takes the place of trying to reach the recipient through direct means. Using a telephone with a standard 12-key dialing pad, the caller can record a message, listen to the message before transmitting it and change it if necessary. Then the caller can send it to one or more recipients, or even to a predefined group (for example, corporate staff).

When convenient to them, the recipients will check their voice mailboxes, scanning to see who sent the incoming messages and choosing to listen to some now and others later. They can listen to the message, stop playing it if they are interrupted, skip ahead or back, or replay the message at will.

After hearing the message, the recipient can generate a reply at once or save the message. The original recipient can also forward the message to a third party and can choose to append comments or instructions to it. When finished, the message can be discarded.

The power of this system is in its ability to relay commands to the voice-mail computer. Commands are entered by pushing the 12 keys on the telephone instrument. The keys generate tones that the computer system interprets; in most systems, proper key selection is relatively easy because most have some kind of voice prompting to explain to the user which key or keys should be pushed next. Many also have a plastic template that fits neatly over the keypad and describes the function of each key (such as skip back 10 seconds, stop playing and skip to next message). The features of voice mail systems are described in more detail on Page 53.

Voice mail has four major advantages over traditional telephone use. A voice message breaks the old dependencies:

• Simultaneity — Requiring both the sender and recipient to be on the line at the same time.

• Geography — needing to know where (that is, the telephone number) the recipient is to complete the call.

• Time — trying to juggle meeting schedules and time-zone differences to catch the called party in the office.

• Serial — having to place a number of similar calls when many people should get the same message.

With voice mail, the sender can place a call without interrupting the recipient, without having to know if the recipient is in the office or travelling and without worrying about time of day or night. In addition, the sender can reach many people with only one message.

TO BE CONTINUED . . .

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Voice Mail Features

Who can use the system?

Closed system:
System subscribers closely control who can gain access to the system outside of the subscriber population. Controlled by use of ID numbers and passwords.

Open system:
System designed to be easy for nonsubscribers (outsiders) to leave messages for subscribers.

What telephone hardware is needed to gain physical access to system?

Touch-Tone telephones located anywhere:
Touch-Tone or equivalent phones are required. A rotary dial telephone can be used in conjunction with a low-cost tone generator.

Proprietary stations:
Some vendors may require special electronic telephones to take full advantage of all the features of their message systems.

What learning aids are available to the subscriber?

Audio prompting:
Audio prompting by the system is used to instruct the user on the options available to him. Some systems have a basic level and an advanced level of audio prompting.

Help:
Some systems have a help key that provides increasingly more fundamental levels of instruction.

Visual templates for telephone keypad:
Some systems provide a simple template to define the commands and the required keystrokes available to the user.

To whom (or where) can messages be sent?

Message queues of subscribers:
System designed to send messages easily to subscriber's message queues only (see addressing, below).

Direct to telephones used by subscribers:
System will dial subscriber's telephone directly.

Direct to any telephone:
System designed to deliver directly to (call up) any telephone in the world.

How are message addresses prepared?

Individuals and groups:
System recognizes group address codes that are prerecorded in system as well as individual subscriber address codes.

Numeric codes:
System accepts numeric address.

Or alpha codes (e.g., last name):
System accepts alpha names for individuals and groups.

System directories or subscriber directories:
System maintains directory of subscribers. Individual subscriber can enter special addresses for his own use.

What type of system data accompanies voice message?

None — simple voice message only:
System plays message as recorded.

System description provided as header to message:
System has prerecorded and provides audio announcements of data and time message sent (time stamp), name of sender and so on.

Does the system provide message categories by which messages can be stored and retrieved?

Basic categories, such as new messages and saved messages:
The most basic set of categories are new messages (not yet received) and old messages (received).

Extensive categories for both incoming messages and outgoing messages:
Extensive categories make it easier to retrieve messages selectively from a high number of total messages stored.

Future delivery — can messages be scheduled for future delivery?
Sender can specify future time when system will deliver message.

How does system manage message storage space?

Specification of retention periods that are automatically enforced:
Saved messages are saved indefinitely or until periodic purging (erasure) or until retention period expires.

Limited length of recorded message:
Message length can be limited to seconds or minutes or can be unlimited.

What type of acknowledgement is available?

Positive: by recipient:
Recipient replays to sender.

Positive: by system:
System recognizes when message is received and notifies sender.

Negative: by system:
System recognizes when message is not received and notifies sender.

Does the system offer volume and speed controls for listening to messages?

Volume controls:
Allows softness/loudness to be controlled by listener.

Speed controls:
Allows speed of playback to be controlled by listener.

The 10 key characteristics described above are the result of a comparison of available voice message systems and industry trends.

I would like to thank Richard J. Murphy, who was helpful in developing this section of the article.

Voice mail is a more productive approach to one-way information transmission. An interactive telephone conversation should never be used for simple requests for information or to pass information along. Voice mail can become a routine part of office communications.

In two-way information exchange, complex points must be discussed or perhaps even negotiated. The interactive telephone call makes it possible to discuss these issues from the convenience of one's own office and can be handled more expeditiously than if a face-to-face meeting were held. But make no mistake, this call is a telephone meeting and should be treated as such.

Industrial psychologists and time-management specialists tell us that effective meetings are planned in advance. Agendas are required to let all parties prepare for the meeting. The parties meet at a predetermined time and settle the issue. We have not adopted the same procedures for telephone meetings because, traditionally, by the time we are connected with the other party, it seems simpler just to discuss the matter, even though one party may not be prepared.

Now voice mail can be used to schedule the telephone meeting and to set the agenda. Then, when the parties connect on the telephone at the appointed time, both are prepared and willing to give the issue their full attention. The telephone call will be focused and productive.

Just imagine a world where you were never interrupted by a telephone call! You dial your voice mailbox to send and receive voice messages at your convenience. The only telephone calls you take are those that have been prearranged and scheduled at a convenient time, enabling you to know who the other party is and why they are calling, thus allowing you time to become fully prepared. For intracompany calls at least, this world can be yours.

Voice mail is attractive as both a supplement and a complement to the telephone, but how does it stack up against other message systems such as memoranda, human message operators, answering machines and computer-based-text mail systems?

Memoranda are so old fashioned, it is amazing there are still so many of them. The memo is first written or dictated, typed by a secretary, routed back to the sender for proofing, put into an envelope that must be prepared, forwarded to the mail room where it might be sent to another office by means of the U.S. Postal Service, routed to the recipient's secretary who opens the envelope, placed in the recipient's in-basket and, perhaps, eventually read. The production costs, handling costs and time delays are staggering.

A telephone message gets the word to the recipient's office more quickly than memoranda. Human operators, however, usually cannot take complex messages. They are unfamiliar with the subject matter and they just don't have the time. Take a look at the pink slips in your office; the block, "Please call back," is almost always checked. Human operators also make transposition errors and are expensive.

Answering machines record the message in the caller's natural voice. But that is where the similarity to voice mail ends. With an answering machine, the caller gets a fixed time within which to leave the message, sometimes as little as 17 seconds. There is no chance to pause, listen to the message before sending, cancel it or broadcast it to more than one person. The recipient must listen to the messages in sequence and has no way of filing the message for later recall. Answering machines are intimidating. They are less expensive per telephone today than voice mail, but they provide far fewer features and benefits.

Computer-based-text mail systems are closely related to voice mail. A text message is entered at a keyboard, stored in the recipient's computerized mailbox and later displayed (or printed) on the recipient's terminal. Text mail first caught the public eye when it was used in Jimmy Carter's '76 presidential race to coordinate Carter and Mondale campaign activities. It provides for the exchange of information at electronic speeds and is in use at hundreds of companies today. The benefits are faster, cheaper and more accurate communications.

Text mail and voice mail have the same store-and-forward concept and both are computer-

based. Text mail is better for longer and more complex messages and is also superior if numbers are involved or unusual names must be spelled out. For brief messages, voice mail is quicker. With text mail, a terminal is required; in voice mail, the telephone is the terminal.

Both text mail and voice mail have a place in modern businesses, each complementing the other to satisfy most forms of one-way information transfer. For simple messages, voice mail is preferable; for longer and more complete messages, computer-based text mail seems better.

While computer-based text mail is well accepted, voice mail is still in its infancy. The first production system is approximately two years old, and only a few vendors are delivering systems. Nonetheless, at least eight vendors have announced products and others are expected by the time this article is published.

Clearly, voice mail is a concept whose time has come.

Selecting a voice mail system depends on a lot of variables. What kind of company is it? What is its current communications profile? How many people will the system serve? What special communications problems will it solve? Properly selected, the system should:

- Increase professional productivity.
- Increase clerical productivity.
- Displace other communications costs.

Depending on the vendor and configuration selected, the cost can be estimated at from $200 to $500 per telephone served. And, according to one study, the next quantifiable benefits can be as much as $1,000 per telephone.

Clearly voice mail is a concept whose time has come. By the end of this year, at least a dozen vendors will have announced products and most will be shipping them to users. A soft economy will dampen order placement for the next six months, but many larger companies will use that time to do their homework. They will investigate voice mail and learn about the alternatives.

Vendors that have not established a position by next spring will find the window for straight voice mail systems closed. There is always room for the innovator, but the opportunities will quickly be foreclosed by the early participants. Voice mail and text mail will become integrated. Voice messages will refer to electronically filed text exhibits and electronic documents will be appended with voice comments. These compound documents are already being discussed by vendors. I call these integrated voice/text message systems "integrated message facilities" (IMF).

The initial workstation for the IMF will be a single integrated terminal telephone. It will have a handset, a dial pad, a 24-by-80-character CRT screen and a lightweight keyboard. An intelligent dialer will enable the terminal to call into a value-added network and log into a data base. Northern Telecom, Inc.'s Displayphone and the French Matra terminal are prototypes. Neither takes up much desk space.

Within a year, terminals like this will be available for less than $1,000. Modestly featured, they are ideal for both voice and text electronic mail and for simple data base access. At low prices, they are far easier to justify than highly featured executive workstations. Once the threshhold volume of these low-cost terminals is reached, the door will be opened for more highly featured devices.

Finally, the IMF will become integrated with the interactive telephone system. One terminal will be the window into all forms of voice and text communications, and the user will be able to transfer from one form to the other as the need arises.

Voice mail, integrated with text and the telephone, will be as common as indoor plumbing by the end of the decade. OA

Ulrich is president of Walter E. Ulrich Consulting, a Houston-based management and technology consulting firm.

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OUTLOOK FOR PORTABLES

The Electronic Briefcase

There is an old joke about the perfect electric car that can run forever, never needs recharging and costs a fraction of the cost of a standard automobile. The only problem is it requires an extension cord 50 miles long.

Although not so extreme, office automation — an area covering everything from desktop workstations to sophisticated electronic mail systems — is plagued by the same problem.

Computers, simplified software and local-area networks have all made it easier for the non-computer professional to access information from a centralized source and to manipulate data into a usable form. However, if you move that executive away from his local-area nest, severing him from his information umbilical cord, he is usually thrown back to the dark ages of paper files and manila folders.

Fortunately, there are two solutions to the distance problem:

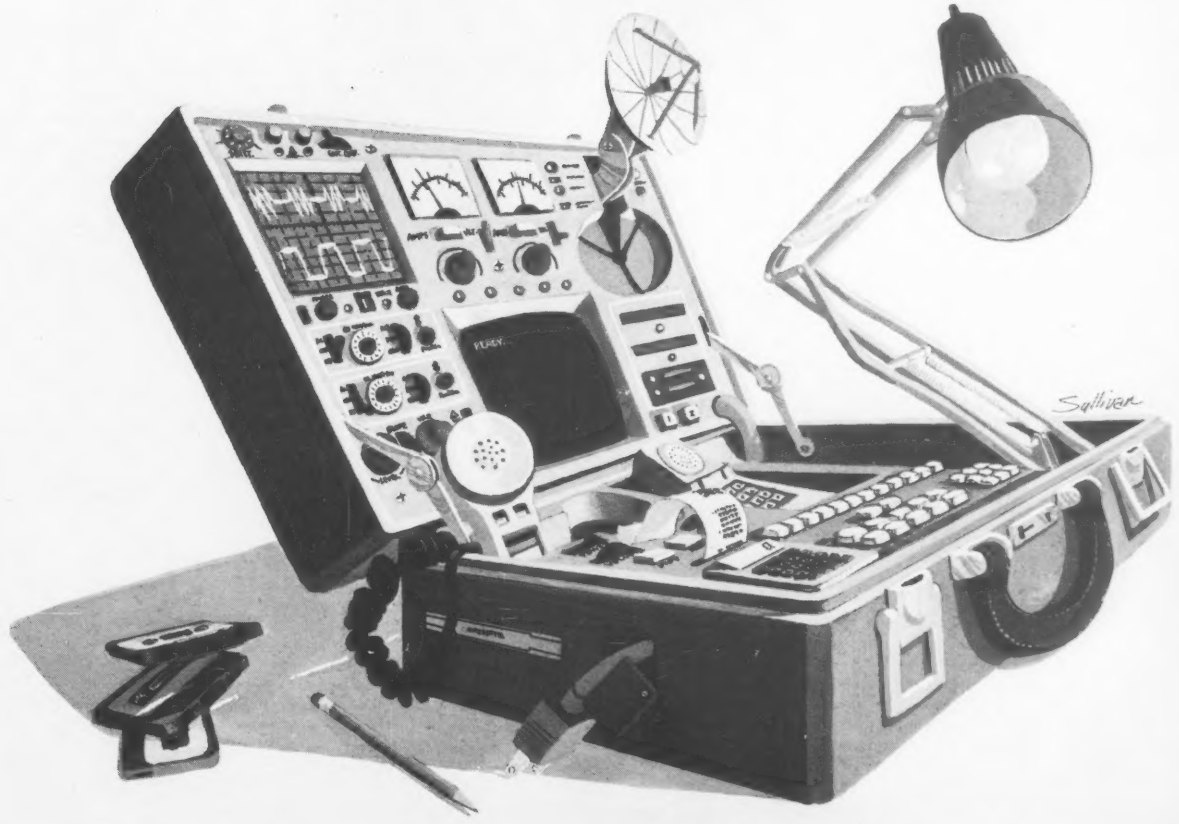


Illustration by Tim Sullivan

BY TIMOTHY J. SCANNELL

1) You can make the local-area network larger, extending the informational "extension cord"—which is really not a solution because of distance limits inherent in the network; or 2) You can design the executive's workstation or desktop computer to be more portable, so it can be taken along on business trips to access information from any location that has a telephone.

Not surprisingly, a lot of vendors both here and overseas have opted for the second choice and have introduced or are about to unveil a line of portable computers that range from calculator-size models that slip into your shirt pocket to suitcase-size data processing systems.

Pocket or hand-held computers are nothing new. In fact, they have their roots in pocket calculators and the small language translators that emerged a few years ago.

Without too much bending of the rules, a pocket computer can be defined as a sophisticated scientific calculator. Both are capable of performing programmable operations, have some kind of an internal memory and can be fitted with such peripherals as printers and tape cassette storage.

However, pocket computers differ strongly from their relatively archaic predecessors. For instance, most pocket computers can be programmed in such user-friendly languages as Basic. Most have expandable memories and can function as remote data communications terminals and, because the microprocessors in the units are the same as those in larger desktop-type computers, their programs are compatible with those of minicomputers and mainframes.

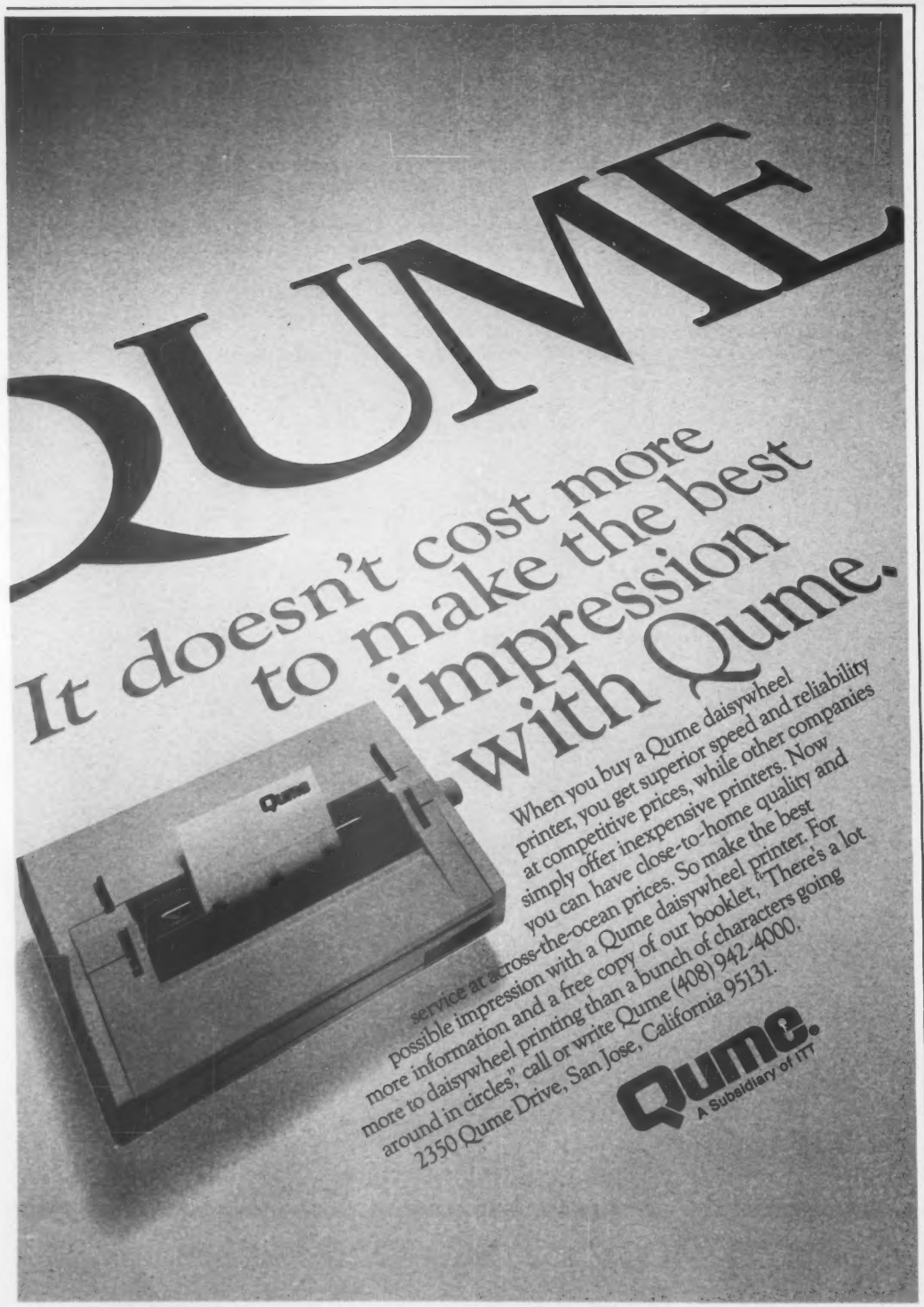
Although hand-held computers are edging closer and closer to desktop turf, most industry experts agree that pocket computers will supplement and not replace their stand-alone cousins. They are strictly on-the-road machines and are not meant to be used solely as stationary computers.

By far the biggest application for hand-helds is as remote terminals that communicate with a centralized computer system. Using a modem and an acoustic coupler, an executive can use a portable computer to pull data from an office data base, manipulate it either remotely or locally and then store the results. This is particularly handy for salespeople who need consistently fresh data for client presentations, or who must input data to a home office on a regular basis.

However, hand-held computer manufacturers are trying to avoid the stigma that their computers are strictly on-line peripherals.

Although about 75% of the hand-held applications now center on the transactions area, in three years that margin could diminish by about 25%, according to Link Resources Corp., a New York-based research company. By 1985, nearly half of a pocket computer's time will be taken up by information retrieval (16%), electronic mail (12%) and stand-alone computations (14%). The biggest applications jumps will be in both electronic mail and computations, which account for only about 2% each of the applications, a Link study showed.

One of the more sophisticated hand-held computers was introduced late last year. Manufactured by Japan's Matsushita Electric Industrial Co., it was designed by Friends Amis, Inc., a San Francisco-based firm that got its start in language translators. Available through both Panasonic Co. and Quasar Co., the two U.S. marketing arms of Matsushita, the hand-held computer (HHC), called the Link, has a processor equivalent to that in Apple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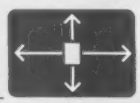


Which kind of editing operation is quickest to execute and easiest on the eyes of the word processing user?

a) Full screen editing allowing for easy cursor movement around the screen?

b) Moving the cursor around by doing a line count?

c) Editing on the bottom line of text only?

2 DOCUMENT LAYOUT

Whatever document format you choose. . .you want to see what the finished article will look like. Should you. . .

a) View it on the screen as it would come out of the printer?

b) Run it through a pre-processor to see what it looks like and then if you like it, print it?

3 KEYSTROKES

Using a well designed w-p system, how many keystrokes should it take to execute the most often used w-p functions?

a) One easy stroke with no codes?

b) Two or more with complex w-p codes?

c) Three or more?

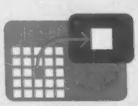
4 FLEXIBILITY

As the business manager of your company, you would like to find w-p software that you can tailor to your company's specific needs. Should you. . .

a) Look for w-p software that allows you to change and add menus, and change function keys?

b) Write your own custom software?

5 RETRIEVAL

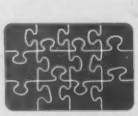


If you want to retrieve information quickly from a large database, which w-p software should you choose?

a) One that can access a particular record by going to it directly?

b) One that searches through all the records on the database sequentially until it finds the right one?

6 COMPATABILITY



As a manager of MIS, you want a w-p system that can be integrated with any other DEC compatable application software. Should you choose w-p software with. . .

a) ASCII formated files?

b) Software which requires non-printing characters in it's file system?

7 MATH

Your company has a number of financial applications and is looking for a w-p package with math capabilities. Should you choose. . .

a) On screen calculating allowing for editing, storing and recall of equations, calculations integrated with your word processing applications?

b) Software where the math capabilities are tied to the list processing module?

c) A separate math package?

THE ANSWERS:

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Computer, Inc. computers, has up to 48K bytes of plug-in read-only memory and up to 52K bytes of random-access memory. With optional adapters, Link can also plug directly into a television receiver for color graphics; communicate with larger computers and/or data bases over standard telephone lines via an acoustic adapter; and be attached to a variety of peripherals, including a thermal printer or any RS-232C-compatible device.

The basic Link sells for $595, which is considerably less than a nonintelligent portable terminal and is obviously more portable.

Both Quasar and Panasonic intend to market the hand-held computer as a "briefcase terminal." The former company's attache system contains a processor, acoustic coupler with integral modem, printer, AC adapter and memory expansion modules. The entire kit — which can double as either a stand-alone or as a portable terminal — sells for about $2,000.

Not to be outdone, Tandy Corp.'s Radio Shack division — a pioneer in the pocket computer field — recently unveiled an enhanced version of its original and primitive hand-held computer. Like other pocket computers, the Model PC-2 features a miniature typewriter-style keyboard, a numeric pad and a single-line display. However, it also has up to 16K bytes of random-access memory, an 80-character buffer and an extended Basic interpreter that can handle a variety of word processing functions. The PC-2, which costs less than $300, should be available sometime before this summer.

Other vendors are fast learning the benefit of packing a computer in a briefcase or pocket. Grid Systems Corp., a relatively new firm based in Mountain View, Calif., recently unveiled a briefcase-size device, Compass, that can be used either as a complete stand-alone personal computer or as a remote terminal. As a terminal, Compass can access IBM Series/1 computers and emulates a variety of terminals including IBM 3101, 2780, 3780, 3741, 3275 and 2770-type machines. It can also interact

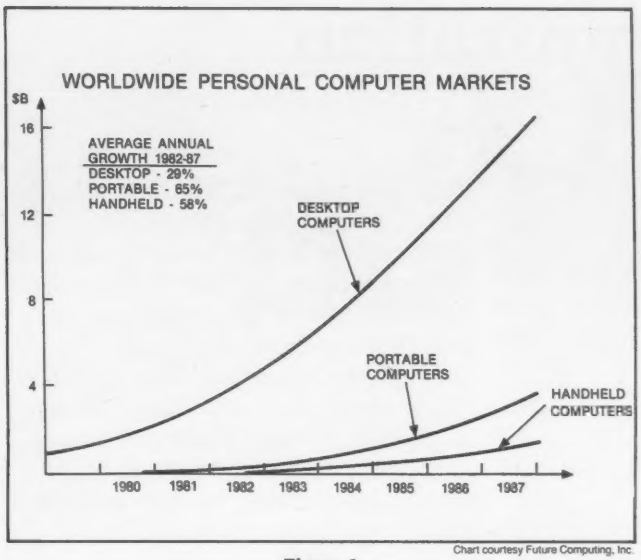

Figure 1

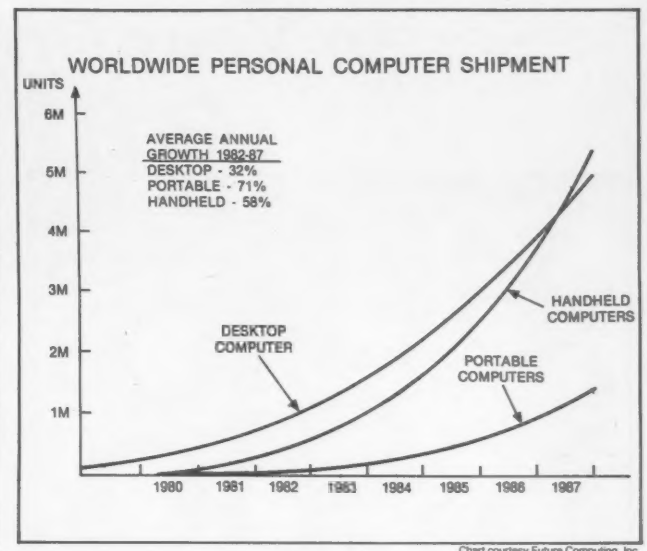

Figure 2

with standard teletypewriter systems, a Grid spokesman claimed.

The Grid system, which costs about $8,000 and has received quite a bit of attention — also features a bit-mapped, flat panel display screen that folds down into the 9¼-pound device for travel.

Although it can be used only as a terminal, IXO, Inc.'s telecomputing system has a full typewriter-style keyboard, a single-line liquid crystal display and a built-in telephone modem.

When plugged into a standard telephone, the pocket terminal can be used to access a remote computer, a time-sharing system or an information data base such as The Source or the Dow Jones information network.

The small terminal's major benefit is its price: about $500 single and $300 in quantities of 1,000. In fact, the company has been virtually giving the terminal away to executives at large corporations in an effort to promote the device to business as the data equivalent of the telephone. The Telecomputer can also be expanded with a variety of peripherals, including a 20-column dot-matrix printer and a video interface that allows a user to escape the bounds of the unit's one-line display and use a standard television receiver to view information.

To be accepted in the much-touted office of the future, handhelds will most likely be combined with common office machines in an automated marriage. In fact, a lot of companies have already announced the engagement.

For instance, in 1980, Sony Corp. introduced a briefcase-size device that can accept typed input and dictation on two tracks of a cassette tape. The data can be manipulated a la word processing or sent to a remote site via telephone. A number of Japanese manufacturers are also reportedly working on dictation/computing hybrids that allow executives to input data, make editing changes and then send the completed copy to another location.

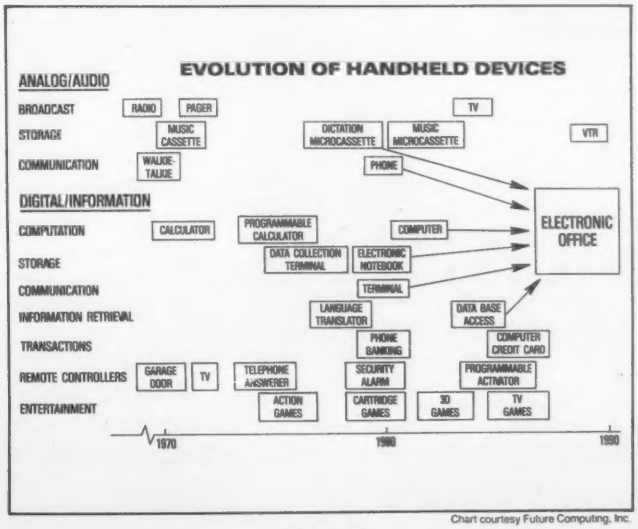

Figure 3

While the technology of hand-helds has made great strides since its calculator beginnings and is forecast to capture at least 30% of the microcomputer market by 1985, the pocket units do have their problems.

Despite their buffer size and memory, pocket computers, because of their size, can display only one or a few lines of data at a time. The small keyboard can also be frustrating for an executive used to a typewriter-sized key spread.

Finally, the hand-helds also have problems with power supply, since they are battery-based and must utilize relatively large amounts of energy-sapping RAM and ROM, and have data compression problems caused by their limited memory.

Most of these problems will eventually be solved as the technology improves. For instance, while a number of Japanese companies are working with an assortment of technologies to produce a flat-screen display, Sony Corp. recently announced the first commercially available flat-screen television that uses known CRT design techniques to produce sharp images on a two-inch diagonal black-and-white screen. The entire television is only 33 millimeters thick.

Sony's screen design might eventually be carried over to the pocket computer to expand the device's limited display space.

However, the hand-helds main feature — their portability — overshadows all of their inherent drawbacks.

"It's not the perfect product, but the fact is, it's selling like hotcakes because portability sells," Portia Isaacson, president of Future Computing, Inc., a Richardson, Texas-based consulting firm, observed.

"Once you get attached to a desktop computer, you really want to take it with you. You want to take it down the hall to the boardroom to show it on a big screen or modify data right on the fly," she said.

According to Future Computing, the pocket computer market is presently expanding at an annual rate of about 58%, and a major portion of this growth is aimed directly at the electronic office. In fact, by 1990, the average $300 hand-held computer will probably have 64K bytes of memory, a 128-character display, multiple languages and 1M bytes of plug-in bubble memory, the research firm predicts. And pocket computers in the $1,000 price range will probably have more capabilities than today's minicomputer.

Besides her firm's optimistic market figures on the pocket computer, Isaacson has another reason for enthusiastically hyping the mini-mainframe's flexibility. She uses a small hand-held to keep track of Future Computing's finances and to communicate with the home office when she is frequently on the road.

"I am president of my company and I worry about the revenues a lot. So, I use it as a management tool every week or every few days," she explained.

Although the pocket computers are closing in on the technological realm held sacred by the desktop computers, there is absolutely no danger that they — or even the suitcase-size portable computers like the Osborne Computer Corp.'s Osborne/1 — will eventually abolish the office-based systems, according to Dr. Egil Juliussen, Future Computing's chairman.

"They do impact, but they also expand each other. You will have a computer on your desk which you will pack in with more power, larger storage and more features as the technology improves. But, then you will also have one of the portables, too," Juliussen pointed out. "I don't see one killing the other." OA

Scannell is senior editor, systems, at Computerworld.

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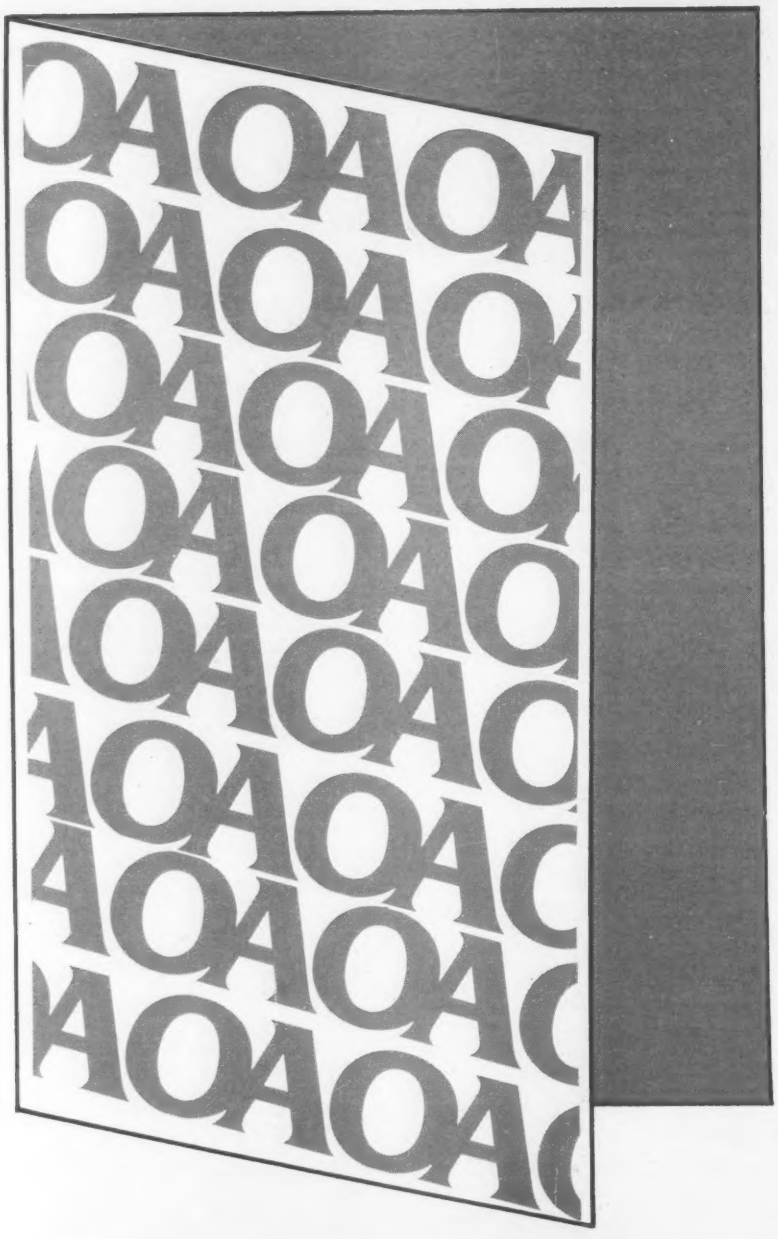
Selling Office Automation to Your Organization



The next issue of *Computerworld OA* will focus on selling office automation within an organization. This special report will feature the human angle of office automation and highlight the strategies of selling the concept of OA to top management and end-users in an organization. You'll see articles on implementation techniques, feasability studies, human interface, ergonomics and productivity.

And, of course, you'll see several articles on current happenings in all aspects of OA.

There will be bonus distribution of this issue to attendees of the Info '82 Show in New York this October. So, if you're a supplier of OA products and services, you won't want to miss the opportunity to advertise in *Computerworld OA's* next issue.

The issue date is September 29th. The deadline date to remember is August 20th for space reservations. (Materials are due August 27th.)

For more details on *Computerworld OA* and the people who read it, just contact your local *Computerworld* representative, or call Bob Ziegel, Vice President at (617) 879-0700 for all the information.

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LINCOLN NATIONAL INSURES OA

A Plan That Worked

Lincoln National Life first became interested in Advanced Office Systems (AOS) in 1977 after preparing an extensive data processing strategic plan. The plan called for a 90% reduction in paper by the end of 1984 — quite a goal, considering the paper intensity of a large insurance company.

An early AOS prototype was developed for the limited use of the DP department. We believed this group would be more tolerant of the problems encountered in an experimental system than the normal unsophisticated end user, although this assumption would be difficult to prove.

Because many delays in information flow occurred at lateral levels among peer groups, rather than vertically between employer and employees, terminals were first made available to DP senior management

BY MICHAEL E. GOLDMAN

and their secretaries. After a few months, we felt the prototype was successful enough to be extended to the law department (because of its extensive word processing requirements) and to the corporation's top executives (because of their communication needs). Within a short time, AOS became an important part of the daily routine in these areas.

AOS has grown since then and now includes approximately 700 terminals operating within the home office complex, with a projected 2,000 installed by the end of 1983 — approximately one terminal for every two employees. The system provides electronic mail, word processing and an easy-to-use nonprocedural language that takes only a few hours to learn.

Creating a user-friendly system has been a real challenge. Some employees access the system daily; others are casual users who access the system simply to check their in-boxes; still others use AOS as a DP tool.

Access by nonusers to the installed programming language has had a major impact. Projects that previously had low priority are being completed by nonprogrammers. These projects would have been endlessly delayed or would have taken longer to explain to a DP staff member than for the users themselves to implement. Completed projects have ranged from minor ones (availability of the company plane and computer up-time) to full-scale operational systems (cash-flow analysis and policy suspense).

Creating a user-friendly system has been a real challenge. Some employees access the system daily; others are casual users who simply access the system to check their in-boxes; still others use AOS as a DP tool.

Organizational changes occurred beyond the mere changeover to automated methods. Users were developing programs quickly, without the use of formalized project plans; development analysts questioned their current use of the company's project life cycle plan. As a result, the plan was pared down to a much more workable guideline. Standards of quality were not sacrificed, but professional programming productivity improved.

Users also began to perform their own data collection. Data that may not be needed on a full-scale corporate level for several years is being recorded magnetically in small personal systems. When and if this data is wanted on a corporate basis, only a conversion program will be needed to incorporate it into a larger system. To prevent companywide data from accumulating on decentralized computers without complete recordkeeping functions, data dictionaries were provided to ensure that all vital information is documented.

Finally, with users designing their own small systems, the development analyst receives living specs on major applications. From the small systems, we can now build large ones.

Unlike a clerk's complaints, which filter upward through channels, the "downtime message" is heard first-hand from top corporate executives. These managers work under nontraditional time frames. They come in during the early morning hours or on weekends and generally appear without warning at their workstations during these unusual times. Keying into an experimental system or one without backup, users have sometimes been frustrated, in spite of the explicit warnings broadcast on the system. To protect a possible lone user from losing critical work, we have established tighter backup procedures and shorter scheduled downtimes.

Formerly, if a secretary resigned or left on vacation, temporary outside help was limited to answering the phone or doing light typing. Two or three weeks were necessary before a person felt comfortable with the system, and those considered "fill-ins" were not trained. Managers, who had become used to certain levels of productivity from their administrative support, found themselves frustrated when temporaries dusted off the previously dormant typewriters. Recommendations have been made to the human resources department to give temporaries minimal training and to keep track of them for future call-back.

The original terminals were all directly wired back to the CPU. Sometimes this could be done by pulling cable through existing conduits, but sometimes new conduits were necessary. Since most of the workstations were designed at a cost of around $3,500 per user, these line costs became excessive when we were connecting just one terminal.

In December of 1981, we purchased units that allow the terminals to share the same lines that carry the telephone system. By means of a frequency level higher than voice traffic, data can be piggybacked on the telephone wires and can be diverted from the phone room to appropriate computers. This allows the office facilities area to move telephones and terminals from one location to another and to have them operational within hours.

Most AOS lines terminate at single nodes that serve as port concentrators. To select the appropriate CPU for their use, users enter an identifier before logon. Terminals contend for paths to computers; when all paths are busy, the user has the option of being queued. Waiting times are

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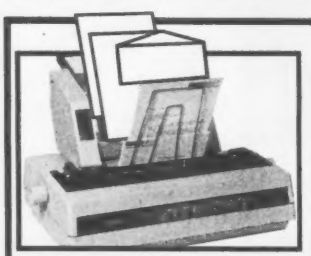

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normally less than a few minutes.

The AOS terminals are start/stop devices and not compatible with the IBM 3270 protocol, for which the bulk of our existing online applications were written. However, paths to an IBM 370 are available and, when selected, other protocols are converted to appear as the 3270. Therefore, from a single terminal, our users have access not only to AOS services, but also to TSO and CICS.

Nationwide access from our field offices via a public packet network was made available in July of 1981. Previously, only local and long-distance dialing had been allowed.

We have appointed certain individuals to be the AOS experts within their department and to serve as backup trainers. They answer most questions asked by new users. In most cases, the backup trainer is the departmental secretary. Although we face a possible liability if we lose the secretary, we feel AOS has enlarged the clerical job and made it more productive and challenging. We believe this will ultimately reduce turnover.

Electronic mail has created another communications conduit. Some individuals who were uncomfortable about confronting executives in person with new ideas have felt more at ease sending messages through the AOS system.

AOS can be impersonal, yet very effective. In our telecommunications area, for example, a manager had an idea about leasing various equipment, but had been reluctant to approach the chief financial officer. While browsing through the system to see to whom he could send messages, he found the chief financial officer listed. He wrote him a message describing his plan and, after several electronic conversations, this idea resulted in a substantial dollar savings.

The company is now embarking upon the implementation of an information center, a place for users to develop more enhanced systems. Besides the AOS language, natural data base languages and other types of report writers will be provided from our larger IBM complex. The AOS information center will become a natural arena in which to educate users and allow them to "do their own thing." The level of productivity and improvements are expected to be significant.

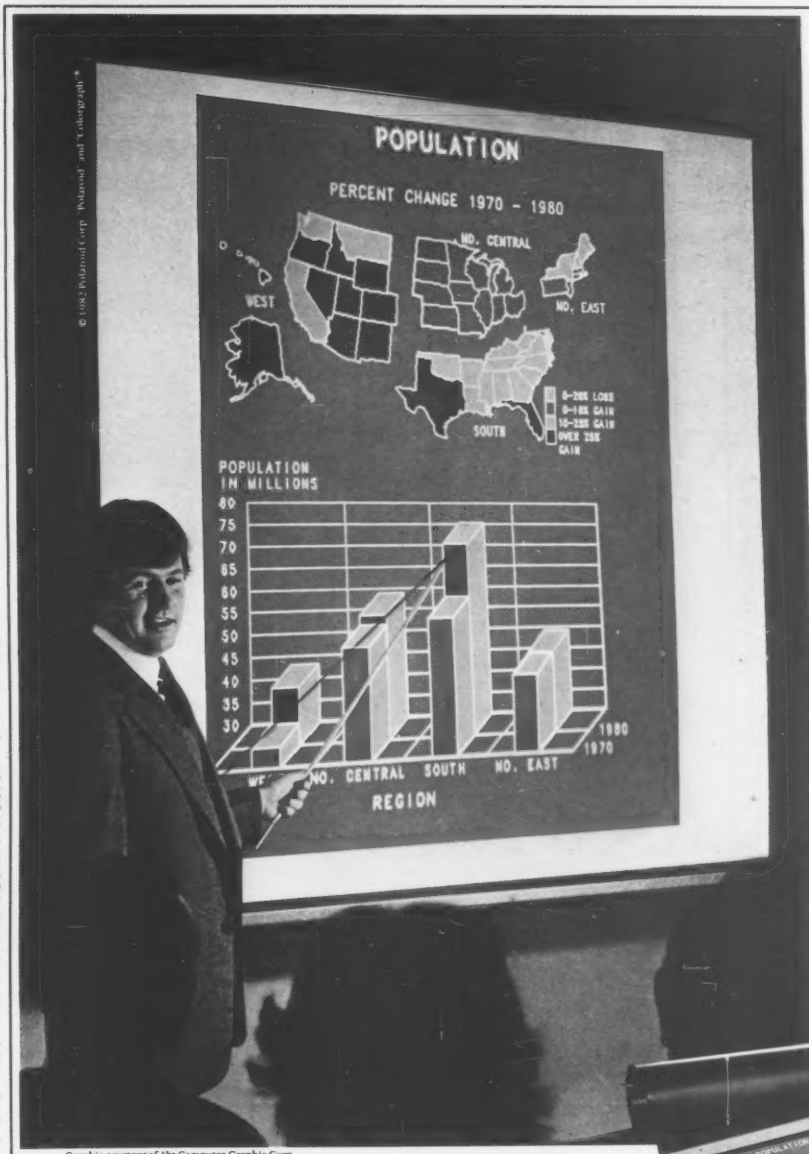
Will we meet the overall objective of reducing paper 90% within the company?

Probably not. Paper still has it uses and individuals are accustomed to thinking with it. Staring at a screen that is 80 characters by 24 lines does not always allow one to grasp a whole thought. To pull out an abstract idea, a person may need to see sheets of working papers side by side. However, these papers will be confined to just a few offices. Only results and recommendations need to be distributed widely. While the volume of paper use may not be reduced, the velocity of the paper between individuals will be.

In future, we will use AOS to enable knowledge workers to expand the capabilities of working with abstract data. Graphics devices that provide multicolor pie and bar charts will allow managers to access and compare decision-making data more easily. By the late '80s, high-speed communications facilities and large data bases — both externally and internally — will be available. An executive will also be able to examine a product's performance within the company and within the industry, possibly on one multicolor screen on the executive's wall.

Improving the professional knowledge worker's quality of work as well as the use of his time is our next step in our Office of the Future. OA

Goldman is second vice-president at Lincoln National Life, headquartered in Fort Wayne, Ind.



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POLAROID

(Continued from Page 21)

• Reasonable implementation costs.

• Opportunities for effectively integrating technologies and equipment.

• User acceptance of the OA technologies.

• An overall successful implementation of OA within your organization.

Selecting the wrong vendor can result in unnecessary expenditures, delay and costly conversion to other vendors' equipment in the future as both your organization's needs and the state of the art in OA technology change. Overall, three basic analyses should be made: one of your organization and its needs, one of the vendor organization and its products and services and one that consolidates and evaluates the information derived from the first two. The following questions provide minimum considerations and a systematic approach for performing the first two analyses.

Analysis of Your Organization

1. *Growth.* What type of growth — sales volume, physical facilities and geographic area — is projected for various aspects of your organization? Can the vendor respond with product offerings to meet the demands imposed by these forms of growth? For example, although a stand-alone word processor without communications capability might be appropriate for your organization today, can the vendor meet your needs if the number of offices expands into different geographic areas? If the vendor offers only word processing equipment without a communications capability, problems could arise.

2. *Size.* Is your organization a Fortune 500 company or is it a small privately owned business? Is it large enough to demand — and receive — special services, priority attention and volume discounts? Which vendors will supply these added benefits in recognition of your organization's size?

If yours is a smaller organization, can the vendor be sufficiently responsive to your needs? Is the vendor oriented to the larger organization to such an extent that your organization's needs cannot be serviced on a timely basis and, in general, in a satisfactory manner? Sometimes a smaller vendor or one new to the OA marketplace will be willing to offer the smaller organization more and better service in an attempt to gain an additional foothold in that marketplace.

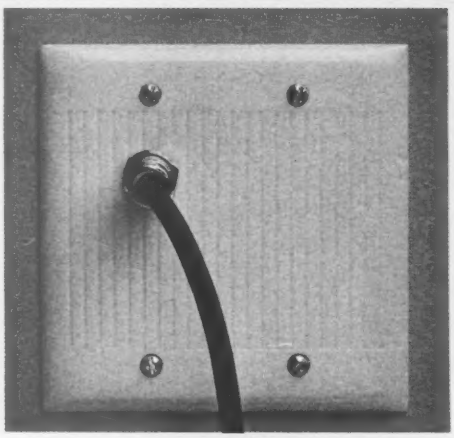
3. *Organization Structure.* Is your organization centralized or decentralized, or does it contain some elements of both? If it is decentralized but top management wishes to maintain some centralized control, communications from a decentralized division to corporate management will be required. This, of course, would require the availability of voice and data communications.

4. *Management Style.* Is your organization innovative in implementing new methods and systems, or will it only implement systems that have been well tested and found successful by similar organizations? Is your organization a risk-taker, willing to implement new technologies ahead of its competition? If so, you might want to consider a vendor that is also an innovator and invests heavily in OA research and development.

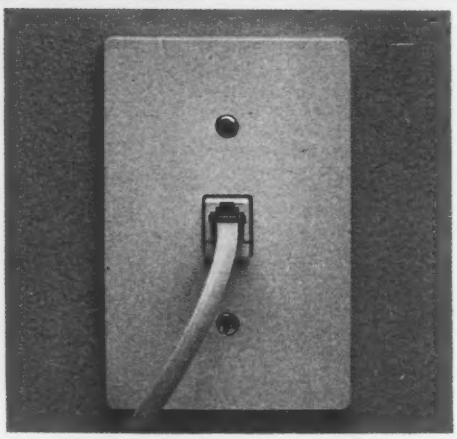
Selecting the wrong vendor can result in unnecessary expenditures, delay and costly conversion in the future as both your organization's needs and the state of the art in OA technology change.

5. *Competitive Environment.* How intense is the competitive environment within your industry, and how complex are your information needs in serving your customers? For example, if you are in the insurance business, where ability to respond to and process customer inquiries quickly is a key factor in the company's services, you may wish to consider a vendor that offers a multitechnology, all-encompassing approach to your information processing capabilities.

6. *Technical Environment.* What data processing, word processing and voice and data communications equipment are in place in your organization? If you have made a large investment in a mainframe computer, is the ven-



Local coaxial network



Advanced digital PBX

The right way to integrate office systems is both ways. And only Datapoint offers both.

dor's equipment compatible with it from a communications viewpoint? Does your organization have a standard analog telephone switchboard on premises or is a digital switch in place? How will this switching equipment relate to new vendor equipment being considered?

Analysis of the Vendor

1. *Primary Line of Business.* What is the vendor's primary line of business? Word processing? Executive workstations? Data communications? Document storage and retrieval systems? Integrated OA systems? Or are most of its resources dedicated to areas not allied to the OA area? The answers can provide an important indication of the extent of the vendor's commitment to the OA area in general and, as a result, its potential commitment to your organization.

2. *Industry Experience.* Does the vendor have personnel dedicated to the marketing and application development of hardware and software which addresses the specific needs of your organization's industry? Can the vendor supply you with literature containing detailed methods for applying its OA technology to that industry? What is the depth of experience of the vendor's personnel in the industry? Vendors can have excellent technical knowledge of their own hardware (and of their competitors') but limited knowledge of your organization's industry and the manner in which your organization can utilize OA equipment to best advantage.

3. *Stability.* How stable is the vendor financially? Does it have the financial resources to withstand the increasingly competitive environment in the OA marketplace? Will it be around tomorrow to service your organization's periodic and emergency needs after the OA system has been installed? The brief history to date of modern OA has already seen some word processing vendors fall by the wayside. Several sources for determining the vendor's financial stability include Dun and Bradstreet reports, vendor annual reports, Security and Exchange Commission filings and vendor analyses published by OA specialists of brokerage and investment houses.

4. *Contractual Responsiveness and Flexibility.* How flexible are the vendor's terms of payment and purchase options? Are its terms sufficiently flexible to meet your organization's financial needs and general business objectives? For example, what type of trade-in allowance will the vendor grant an organization that wants to trade in equipment for an upgraded line? Will the vendor install equipment on a test-rental basis before your organization has to make an OA lease-or-purchase decision? Is the vendor willing to supply your organization with a detailed outline of products and services that it will deliver based on a specific timetable, and will that timetable be part of the contract, including nonperformance penalties?

5. *Installation Base.* How many successful OA systems has the vendor installed in your organization's industry? In which companies can the vendor demonstrate such systems in actual operation? What are the opinions of the users of such systems? Visiting user sites where the vendor's equipment has been installed and obtaining comments directly from the users is a better approach than that of phoning executives of the user companies for vendor evaluations. Observing the use of new OA equipment under actual field conditions will provide you with a better opportunity for evaluation because some executives may be unwilling to admit during a telephone interview that they made a mistake in selecting the particular vendor after investing thousands of dollars in that vendor's OA equipment.

6. *Promises, Promises.* How do the vendor's promises and plans for services and new product development match the commitments it makes? Does the vendor deliver new products close to the planned and announced dates of product introductions? In an attempt to keep their names before the public, some vendors prematurely announce new product introduction dates that they cannot meet. Judicious questions of current users of the vendor's OA equipment can establish whether the vendor delivers on its promises of service, follow-up support, training and new product development.

7. *Training.* People are a key ingredient in the success of an OA installation. I recently observed a vendor representative — a technician — who attempted to train users in only a few days. After the training sessions — too technically oriented for the average user — were concluded, the vendor simply packed his bags and left the customer struggling for months trying to learn how to use the system. What type of training does the vendor offer? Are orientation sessions in OA provided for top-level executives, middle management and clerical personnel to

When you plan your company's "office of the future," you're faced with a dilemma. The two most basic methods for tying office information devices together — the local network and the advanced voice/data PBX — both have pluses and minuses.

The local network uses coax cabling and gives you all the speed and power that heavy DP and WP users need. It's efficient, but the cost per user can be relatively high.

The advanced PBX is a less expensive way to connect information users, *but* it's not quite as fast as coax which may be a drawback for heavy users.

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With Datapoint, you can connect each user workstation via the system that suits him best; heavy users via the local network, lighter users via the PBX. The local network and the PBX are completely compatible, so every user can still reach any information or other user no matter how he is connected.

The local network and PBX can form one totally integrated system, or stand alone. You can start with whichever system you need now, and add the other later.

The local network and advanced digital PBX are both building blocks within the Datapoint Integrated Electronic Office™ or IEO. They are the communications pathways that let you fully integrate data processing, word processing, electronic message service, telecommunications, color business graphics, intelligent printing, and facsimile. Only Datapoint offers all these capabilities in a completely integrated, easy-to-use information system.

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The local network portion of the IEO is the Datapoint Attached Resource Computer® or ARC.

With ARC, Datapoint introduced the concept of local networking more than four years ago. Today there are more than 2,000 ARC systems installed worldwide, more than all other local networks combined.

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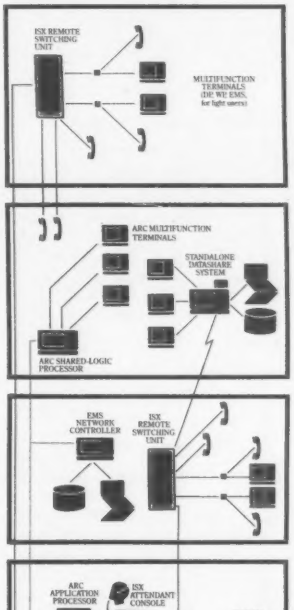

No matter how far you expand your ARC system, you continue to get fast response at every workstation because you can add processing *power* as you expand.

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DATAPOINT

SYSTEMS THAT WORK TOGETHER NOW

provide a smooth transition to the use of the new OA equipment? Is hands-on training of clerical and administrative personnel supplied initially and on a follow-up basis for new employees? What is the quality of user documentation provided by the vendor? Does it require a Ph.D. to decipher it? Does the vendor software provide a help function as part of its system to provide additional training support? What are vendor charges, if any, for these training services? What type of additional training is offered by the vendor as new software and equipment features are purchased by your organization?

8. *Service.* What is the availability of vendor service personnel to your organization's offices, both nearby and at remote locations? At what times of the day and on what days of the week can the vendor provide appropriate service? How long will it take for the vendor to respond to service calls? Is there a guaranteed response time as part of the vendor's service agreement? What are the opinions of current users of vendor equipment regarding the quality of vendor service? And does the vendor provide adequate backup service and support in the event of extended downtime on equipment purchased from it?

9. *Plans.* Is the vendor willing to share some of its plans for the future with your organization so that you can determine whether the vendor's direction matches your OA direction over the long term?

A Rating Methodology

How do you select the vendor after you have answered the foregoing and other questions that most likely will have come to mind? One approach we use to assist our clients is to prepare an analysis based on numerical values given to answers to such questions. The process is as follows:

(1) Each question is assigned a value of 1 to 10 in order to rank the relative importance of each question for your specific organization (1 for least important, 10 for most important).

(2) Each question is matched against or answered in light of the vendor's response to the question. Each such response is also given a rating of 1 to 10 (10 for most responsive, 1 for least responsive).

(3) The value of the vendor's response to the question in Step 2 is multiplied by the rating your organization assigns to the question in Step 1 to provide a weighted response to the question.

(4) The weighted responses to the questions are totaled for each vendor. This will provide indications of each vendor's relative ability to meet the OA needs of your organization.

For example, assume that during the next calendar year, your organization plans to open eight new offices, five of which will require text and data communication with the home office. You decide this planned action has a numerical importance of 10 on a scale of 1 to 10 (see Step 1). Your analysis of vendors X, Y and Z indicates their abilities to respond appropriately to this plan (that is, to provide communications technology and serve the remote offices) have relative ratings of 5, 7 and 9, respectively. The weighted score for each would therefore be 50, 70 and 90, respectively. This process would be carried through on all questions to produce a total weighted score for each vendor.

A selection cannot always be made solely on the basis of a numerical rating. Some things cannot be quantified; they require judgment and experience.

OA

Girard is an office automation consultant in the Data Systems Technical Consulting Services group of the New York office of Ernst & Whinney, an international certified public accounting firm.

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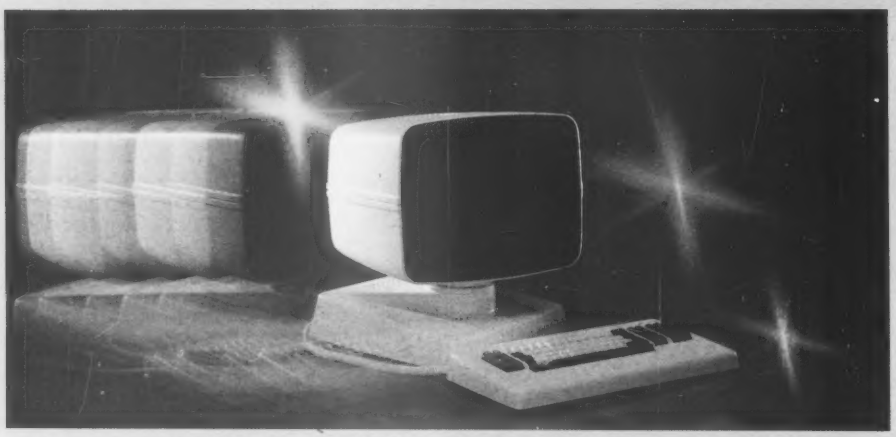

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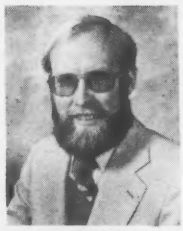
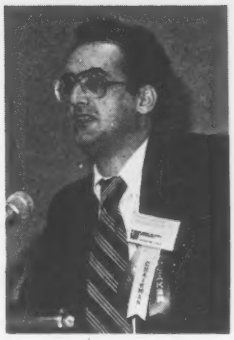


Dr. John McQuillan, President, BBN Information

Amy Wohl, President, Advanced Office Concepts Corp.



Howard Anderson, President, The Yankee Group

THE OA FORUM
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September 13-15, 1982
Marriott Long Wharf, Boston

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The OFFICE AUTOMATION FORUM will give you the information you need in three days of sessions that will address the main issues facing EDP professionals in word processing, electronic mail and office automation. You will get specific answers to these major questions:

First day: Personal Computers in the office — are they the answer to office automation and distributed processing?

Second day: DP vs. WP in Office Automation — how can DP expedite office automation in human terms and with bigger corporate payoff?

Third day: In-Depth Seminars in Advanced Communications and Office Automation — how can communications tie systems and users together for optimum use of company resources, for today and tomorrow?

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The sessions will be practical with an emphasis on leading user and consultant experiences. Many of our speakers have written articles for *Computerworld OA* or *InfoWorld* and some of the editors will chair panels. There will be a full schedule starting with "Early Bird" sessions at 7:30 a.m. and ending with evening discussions and practical first-hand advice.

Speakers will include:

Monday, Personal Computers in the Office
Dr. Harold Kinne, President & Founder, Halkin Computing Corp.
"The Future of Information Appliances"
Jean Yates, Gnostic Concepts
"Micro Operating Systems"
John Dvorak, Editor, *InfoWorld*
"New and Future Products"
Maggie Canon, Editor-In-Chief, *InfoWorld*,
Panel: "Personal Computers in the Office"
Howard Anderson, President, The Yankee Group
"The IBM Personal Computers: The Effects on the Industry"

Tuesday, DP Role in Office Automation
Amy Wohl, President, Advanced Office Concepts Corp.
"Achieving the Possible"
Patty Seybold, Editor, The Seybold Report
Dr. John McQuillan, President, BBN Information Management and *Dr. Michael Zisman*, President, Integrated Technologies Inc.
"OA Survivors Guide to Multivendor Environments"
Evelyn Wilk, Consultant, Arthur Andersen & Co.
"Management and Professional Work Stations"
Alexandra Corson, Program Director, IDC.
Panel: "IBM Software Strategy"
Dr. Warren Briggs, Suffolk University
"Distributed Decision Support Systems"

Wednesday, In-Depth Communication Seminars
Dr. Dixon Doll, President, DMW Group
"PBX Role in Office Automation" & "Teleconferencing"
Thomas A. Hannagan, President, Hannagan & Associates
"Electronic Mail: Systems Selection and Implementation"
Dr. Michael Hammer, Associate Professor, MIT
"Planning OA Programs"

Costs for the OA Forum are: Personal Computers in the Office (Sept. 13) $145; DP's Role in Office Automation (Sept. 14) $245; In-Depth Advanced Communications Seminar (Sept. 15) $295 (includes seminar materials and professional course instruction). A special three-day combo registration is only $595 which includes lunch daily.

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(Continued from Page 23) take him to the computer store with you. It's not impossible to find a decent micro-based WP system, but do your homework. When it comes to software, you're not likely to buy more than one WP program — make that selection the right one.

Personal computers for word processing are not generally sold as ready-made, turnkey systems. The user is responsible for finding and testing all system components prior to purchase and, with the help of the dealer, putting together a system adequate for his needs. Remember, this burden of responsibility rests squarely on the shoulders of the customer, not the dealer. The dealer will help to make sure all the selected components are compatible and can be plugged into each other, but the user must become familiar with the various types of hardware and software in order to design a system that will fulfill his or her needs.

Unlike higher-priced, dedicated WP systems — which are sold as complete packages — the typical personal computer system may be composed of a variety of devices from different vendors. Because of this, it is much easier to identify the weaker elements of a proposed system and to find alternatives. By studying each component separately, you can assess the general capabilities of a personal computer for WP. Some guidelines for choosing a system can be established by looking a little closer at the components of the micro-based word processor: the microcomputer, display, disk drives, software, printer, documentation and miscellaneous hardware requirement.

The relative size of the computer's power can be judged by two basic features: main memory and bit-processing capability. In main memory, 48K bytes are needed to provide a minimum of text processing functions. The more memory available, the more data can be maintained in working memory prior to storage on floppy disks.

As for bit-processing, most personal computers are 8-bit machines, and there is not a lot of choice in this category. When possible, however, take a serious look at any personal computer offering 16-bit processing. The increased power can greatly enhance the speed with which the computer can process text information, which improves the unit's overall efficiency.

Look carefully at the computer keyboard; it is important for text-entry applications. Not all keyboards are easy to use or designed like a common Selectric typewriter. Some lack keys you might consider essential; others are loaded with extra keys that can be programmed for special functions.

Personal computers for word processing are not generally sold as ready-made turnkeys. The user must find and test system components prior to purchase.

In general, the keyboard should closely resemble that of an electric typewriter and should at least have dedicated keys for the four basic cursor movements (up, down, right and left). Any additional special-function keys are most welcome, but are not generally available. Some units, like the IBM Personal Computer, offer user- or software-definable function keys that can be adapted for any purpose. These extra keys can be used by independent software developers to enhance a standard personal computer package — an approach to keyboard/computer design that should be happening more frequently in the future.

Users are often reluctant to spend a lot of money on the CRT that works with a personal computer, even though this is the key component of interface. When considering a CRT, keep the following in mind:

• Buy a separate terminal that matches your size needs and screen-color preferences.

• Try to use a computer that can generate an 80-column screen. Most do, but some — like Apple Computer, Inc.'s Apple II Plus — require a hardware modification to show 80 characters across the screen width instead of their standard 40. This modification could cost $250.

• Make sure the character generator in the computer can display both uppercase and lowercase characters. This is a must for word processing, but is not a standard feature on many small computers. Again, a modification (if available) to show uppercase and lowercase characters will cost extra money.

• Choose a screen with a comfortable color. Green phosphor is the industry's current de facto standard and is easy to stare at for long periods. The traditional black on white or white on black is not nearly so comfortable over long periods.

• Try to choose a computer that will generate characters of good resolution on the screen. The typical computer displays text using a 5 by 7 or 7 by 7 dot matrix for each character. A higher resolution, 7 by 9 or even 9 by 12, will be easier to stare at and read.

• Watch out for the screen format adopted by your software package. You should choose a system that shows text on the screen in paragraph representation. The typical DP text package will use a single-line orientation that will actually return to the left margin at the end of each sentence and will never visually depict true paragraphs. Most WP packages for micros avoid this, but be aware that there are a few like that out there.

I would never recommend the use of magnetic cassettes for WP applications, although many people on a tight budget may have to use this medium. Cassettes may be valuable as a good archival medium for historical storage but, in general, they offer very ponderous access time and lack the instant access diskettes provide.

Floppy diskettes for personal computers come in 5¼-inch and 8-inch sizes. The 5¼-inch variety are naturally less expensive, but they also store less information. The typical single-sided, single-density 5¼-inch minidisk can hold about 40,000 characters — roughly equivalent to 30 pages of typical text. That's not a heck of a lot. Eight-inch floppies, on the other hand, can often hold more than 100 to 150 pages of information — a big difference when you create long documents or need a sizable data base of text.

For mass archival storage, the best available alternative for the personal computer is the 5¼-inch mini-Winchester disk ("mini-Winnie"), which has become generally available for some computers. This small hard disk can hold from 10M bytes to 40M bytes, depending on the make and model. That's like having scores of standard diskette drives lined up in a row. The price for a mini-Winchester drive — from $5,000 and up — is usually prohibitive for the average user, however, and may exceed the total price for the rest of the system.

Software for personal computers is available either from the computer makers themselves, or from independents that write programs for the most popular brands of computers. Literally dozens of WP packages are available for each of the major brands of personal computers, and great care should be taken in selecting one. Never buy a software package without trying it first. Even the most popular WP packages may not satisfy you totally, and you should keep looking until you find the perfect package for your needs. Chances are, if you look hard enough, you'll find it. This may require going to a few computer stores, but your software investment is worth it.

You will want to consider the following factors when you select a WP package:

Hardware Requirements — The operator's manual of the software package will list the type of hardware needed in order to run the package. Make sure your system meets these basic requirements or you will be wasting your money. Special considerations might include the need for a special language card (like Pascal or Cobol), an 80-column converter card, an uppercase/lowercase converter card, two disk drives instead of one and so on.

Functional Features — Closely scrutinize the way the package performs. You can do this only by sitting down and testing the system yourself. Do not allow a salesperson to run through the operations for you. Do it yourself and question, question, question. In particular, look for the following:

• **Basic Features** — Does the package take care of your fundamental WP needs? Look for such functions as basic editing tools, word wrap, character searches, search and replace, scrolling through memory, column justification, tab sets, margin adjustments, centering, indents, block move and underlining.

• **Command Structure** — How complicated are

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the commands used by the system? Are they easy to remember? Are they logical? Are they simple (two keystrokes) or complicated (more than two)?

• Menu-Driven Systems — Most microcomputer software packages employ menus from which the operator selects system functions. This approach is fine for the beginner and saves the user from having to refer to the operator's manual too much. However, it is time-consuming and even annoying if you must continue to use a menu after the command structure is mastered. A flexible system will permit commands to be entered directly sometimes, bypassing the menu entirely.

The functional features of a package lead inevitably to certain conclusions regarding the ease of use of a software program. The best way to judge the general operation of one package is to compare it to others. In your comparison, consider:

☐ Processing Speed — Is the package fast or slow?

☐ Command Structure — Is it logical and easy to remember?

☐ Menus — Are they complete and self-explanatory? Can you bypass them once you learn the commands?

☐ Editing Features — Are they easy to perform?

Until recently, the only acceptable type of printer for word processing was a daisy-wheel device that produced typewriter-like print. A typical daisy-wheel printer easily can cost more than the computer itself, and it is rare to find one selling for less than $2,000. Recent developments in matrix printer technology have produced a number of lower cost models that deliver print that is almost, but not quite, of a typewriter-like quality. The true issue at hand becomes one of need.

Every separate component of a personal computer system comes with its own operator's manual and documentation. Bad documentation can make a good system seem impossible to fathom. Check for the following:

• Is it written for the beginner or the expert? Do you consider yourself a beginner or an expert?

• Among the various competitive products, which has the best documentation? Compare them and you will be able to judge which are better than others.

• Are the instructions clear and precise? Do they accurately cover each step necessary to perform a system function?

• Is there a section covering possible problems you may encounter? Is there a phone number you can call for advice? If a number is given, call it to make sure the company is still in business (especially with software packages).

• Is the documentation well illustrated?

• Is it well indexed?

• Does the documentation answer all your questions?

When you have finished your evaluation of a proposed personal computer system for word processing, you have only two tasks left: Find the most competitive price for the system, and look into the kind of service and support you can expect from the dealer.

When you check on service, find out the type of training available, the kind of warranty provided for the equipment and the availability of pick-up and delivery at your site if the equipment needs attention.

The guidelines outlined in this article should better equip you to face the personal computer salesperson. Remember, you and you alone are responsible for selecting the best system at the best price. If you were buying a car, you would get a test drive. Do the same with personal computers for word processing. # OA

Thom Holmes is executive editor of small systems and special projects with Datapro Research Corp. in Delran, N.J.

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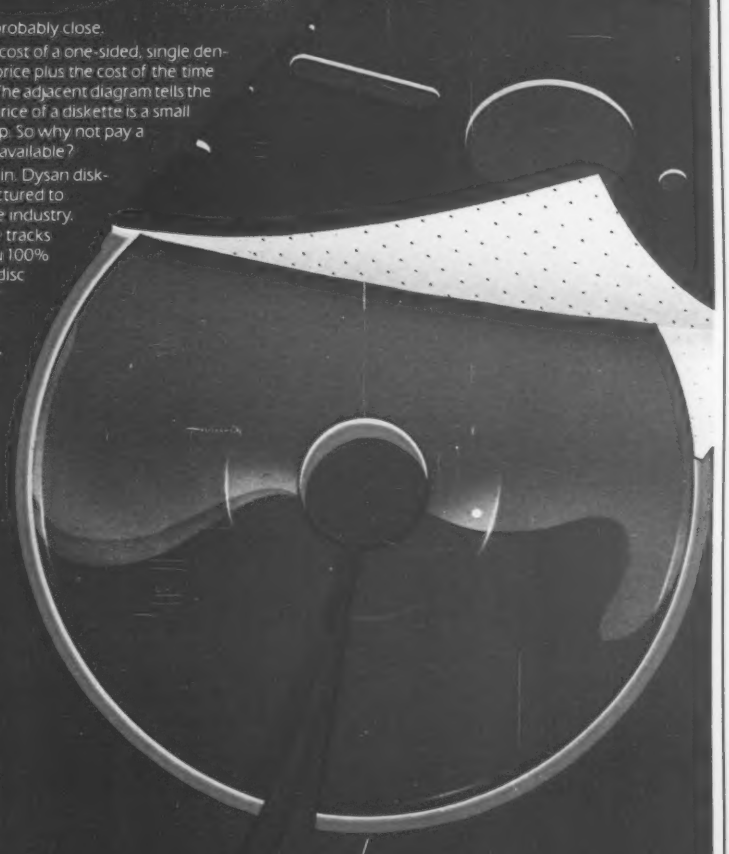

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*$182.50 represents the cost of data loading (approximately 22 hours at 11,106 keystrokes/hour at a labor cost of $8.23/hour), based on 1981 Data Entry Management Association (DEMA) National Averages.

TECHNOLOGY

Six companies have agreed to adopt the Specification for Message Format for Computer-Based Message Systems developed by the National Bureau of Standards as a proposed federal information processing standard. The companies are **BBN Information Management Corp., Computer Corp. of America, Dialcom, Inc., Digital Equipment Corp., GTE Telenet Communications Corp. and Tymnet, Inc.** This step is intended to facilitate electronic message exchange among the firms' various electronic mail offerings.

Wang Laboratories, Inc. debuted its personal computer as well as two entry-level VS office computer systems, a multifunction graphics workstation and enhancements to the 2200 minicomputer systems, in addition to other peripheral equipment. The 16-bit Professional Computer can function as a workstation on any Wang 2200, VS, OIS or Alliance system in a stand-alone mode, or through coaxial cable to other Wang products, through phone lines to Wang and other devices or through the Wangnet local-area network. The system runs under Microsoft Corp's. MS-DOS and has optional Digital Research, Inc. CP/M emulation. Prices range from $2,695 to $8,945. Wang has also introduced a laser printer for $27,995 and expanded its Mailway electronic mail system for use on any telephone using teletype-compatible portable terminals. Wang is headquartered at 1 Industrial Ave., Lowell, Mass. 01851.

The Ofiswriter 400 word processing system was introduced by **Burroughs Corp.** and features an electronic document distribution system that stores and transmits frequently used document lists. A single-disk Ofiswriter 400 without printer begins at $4,900 or $200/mo. on a lease, the vendor said; the purchase price for the two-disk system starts at $6,000 or $250/mo on a lease. The Burroughs Office Systems Group is at Danbury Executive Tower, 30 Main St., Danbury, Conn. 06810.

Corvus Systems, Inc. has debuted its personal workstation that reportedly attaches to the vendor's Omninet local-area network. The Corvus Concept terminal features a 32-bit Motorola, Inc. 68000 processor, 256K bytes of random-access memory (expandable to 512K bytes), the Corvus Logicalc spread sheet and access to over 2,000 CP/M programs. The Concept costs $4,995 in full network configuration, Corvus said from 2029 O'Toole Ave., San Jose, Calif. 95131.

Comshare, Inc. has introduced a color graphics system for executives in which data can be accessed on a keyboardless terminal via a light pen or a remote control key pad. The software for the Commander Executive Management Reporting system runs on IBM or plug-compatible mainframes using VM operating software. The entire package with all capabilities costs $110,000. Comshare is at 3001 S. State St., Ann Arbor, Mich. 48104.

Grid Systems Corp. unveiled a 9¼-pound portable personal computer with an integrated set of software packages, a "budding" support network of IBM Series/1 computers and a high-resolution bit-map display screen that folds down. The system, which fits into a briefcase, offers program development tools and application programs that include text editing, graphics, a project management data base, an electronic spread sheet program and terminal emulators. The basic Compass computer costs $8,150 and will be available in September, the vendor said. Grid is located at 2535 Garcia Ave., Mountain View, Calif. 94043.

Mitel, Inc. has introduced a voice/data private branch exchange (PBX) system, the SX-2000, that reportedly supports a minimum of 768 ports, which, along with all other basic system components, fit into a single cabinet. Three more cabinets, each holding 1,536 ports, can be added to form a "single-group" system. Available the first quarter of 1983, an average system would cost $800/mo, the firm said from 600 W. Service Road, Dulles International Airport, Washington, D.C. 20041.

Four-Phase Systems, Inc. has introduced a family of computer systems featuring a personal computer option, touch-sensitive screen, voice store-and-forward capabilities and a broadband local-area network. The Series 5000 family is composed of three processors: the systems 500, 700 and 800. Price for a typical system is $475,800. The VS200 voice store-and-forward option is a stand-alone system for voice mail. The microprocessor-based system contains local storage and connects to a PBX. It costs $150,000. Four-Phase is located at 10700 N. DeAnza Blvd., Cupertino, Calif. 95014.

A desktop automatic document-entry terminal based on optical character recognition (OCR) technology is being offered by **Dest Corp.**, which claims it can enter text from typewritten pages into several major word processors in 25 sec. The Workless Station reportedly reads copies as well as originals typed in any of eight common type styles. The format processor option costs $1,495, the Model 201 costs $6,995 and the Model 202,

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Fortune Systems has introduced Forword, a word processing system that includes global formats, mixed text and graphics, text centering and free-form file names; and Multiplan, a software tool that allows users to create financial models and develop business plans. The basic unit costs under $5,500, the firm said from San Carlos, Calif. 94070.

Honeywell, Inc. unveiled a network switching system, the Roadrunner Digital Edition, for integrating private voice and data networks. It will cost between $2 million and $5 million and will be available this fall, according to the vendor. The company also introduced a message handling system, the DPS25 Distributed Packet Data Switching System, which interfaces, connects, concentrates and provides X.25 protocol conversion for a variety of office automation terminals. Prices for this product begin at $14,000 and go up to several million dollars, the vendor said from 4401 Beltwood Parkway S., Dallas, Texas 75234.

The 900 series of integrated desktop computers recently introduced by **Durango Systems, Inc.** can handle up to five users and features up to 15M bytes of Winchester disk storage, according to the vendor. The prices for the 7M-byte system begin at $11,950, and the 14M-byte system starts at $13,450, Durango said from 3003 N. First St., San Jose, Calif. 95134.

CIE Systems, Inc. has announced a series of single-user and multiuser small business systems that incorporate both 16-bit microprocessors and Intel Corp.'s Multibus communications bus. The 680 systems are also software-compatible with Bell Laboratories' Unix System III and Motorola, Inc.'s Versados operating systems. The 680 family ranges in price from $5,500 to $12,000, and the company is based at 5 McCabe Way, Box 16579, Irvine, Calif. 92713.

Northern Telecom, Inc. has unveiled a private branch exchange offering voice and data communications features for installations with 60 to 400 lines. The SL-1M features all current SL-1 capabilities, plus it allows users to effect most service changes without technical assistance, according to the vendor. Depending on configuration, it is priced between $25,000 and $300,000, Northern Telecom said from 1001 E. Arapaho Road, Richardson, Texas 75081.

Digital Equipment Corp. announced its personal computer entries: the Rainbox 100; a dual-microprocessor design, one a Zilog, Inc. Z80 and the other an Intel Corp. 8088; the Decmate II, said to be a replacement for the current Decmate and geared to WP and specific business applications; and the high-end Professional 325 and 350, designed as stand-alone systems or distributed workstations in medium and large-size companies. Prices range from $3,245 to $4,995. In other announcements, the firm introduced its All-in-1 package, which consists of layered software products with packaged hardware systems that can be accessed from the VT100 and personal computer family. Digital also unveiled its electronic mail packages for its Decsystem-10 and Decsystem 20, and Decnet Phase III networking capabilities for Decsystem-20.

The firm also announced support for the Ethernet local-area network and a range of Ethernet products that will be integrated into Phase IV of DEC's Digital Network Architecture sometime during the next three years. Ethernet products being offered include a transceiver, a communications controller and servers and supporting software, the firm said from Maynard, Mass 01754.

The Basic Four Information Systems Division of Management Assistance, Inc. has introduced an entry-level micro and a high-end minicomputer. S/10 and 810 come with previously unavailable operating systems and support two other recently announced Basic Four software products: the Office Management System (OMS), which automates several office functions, and the Office Display Terminal, which is reportedly optimized to support the OMS software and to aid in both word and data processing. Prices on the systems start at $6,000, according to Basic Four at 14101 Myford Road, Tustin, Calif. 92680.

Hewlett-Packard Co. unveiled a personal computer system that features a high-resolution, 80-col text and graphics display and up to 544K bytes of memory. The HP 87 costs $2,495. HP has also expanded its HP 250 office systems line by introducing a movable computer that features a sealed 4.7M-byte Winchester disk drive and 1.2M bytes of flexible disk for personal I/O and backup. The HP 250/20 costs $18,250, which includes the processor, a system workstation, the Winchester disk drive and a flexible disk backup. Additional workstations each cost $2,500.

HP has also unveiled an electronic mail package for the HP 3000 system which costs $10,000; the right to copy software is $7,000, HP said from 1820 Embarcadero Road, Palo Alto, Calif. 94303.

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CALENDAR

June 20-22, Andover, Mass. — **Electronic Mail: Implementation Case Studies.** Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

June 23-25, Los Angeles **Network Communication Protocols.** Contact: Center for Advanced Professional Education, Inc., 11928 N. Earlham, Orange, Calif. 92669.

June 26-30, San Francisco — **Planning for Office Automation: Concepts and Practices.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 28-29, Denver — **Office Automation Workshop.** Contact: Linda Megill, Office Automation Seminars, P.O. Box 153, Springfield, Va. 22150.

June 28-30, New York — **Integration of Word Processing and DP Systems.** Contact: Datapro Research Corp., P.O. Box 153, Springfield, Va. 22150.

June 28-30, Philadelphia, Pa. — **Network Communication Protocols.** Contact: Center for Advanced Professional Education, Inc., 11928 N. Earlham, Orange, Calif. 92669.

July 7-9, Denver — **Network Communication Protocols.** Contact: Center for Advanced Professional Education, Inc., 11928 N. Earlham, Orange, Calif. 92669.

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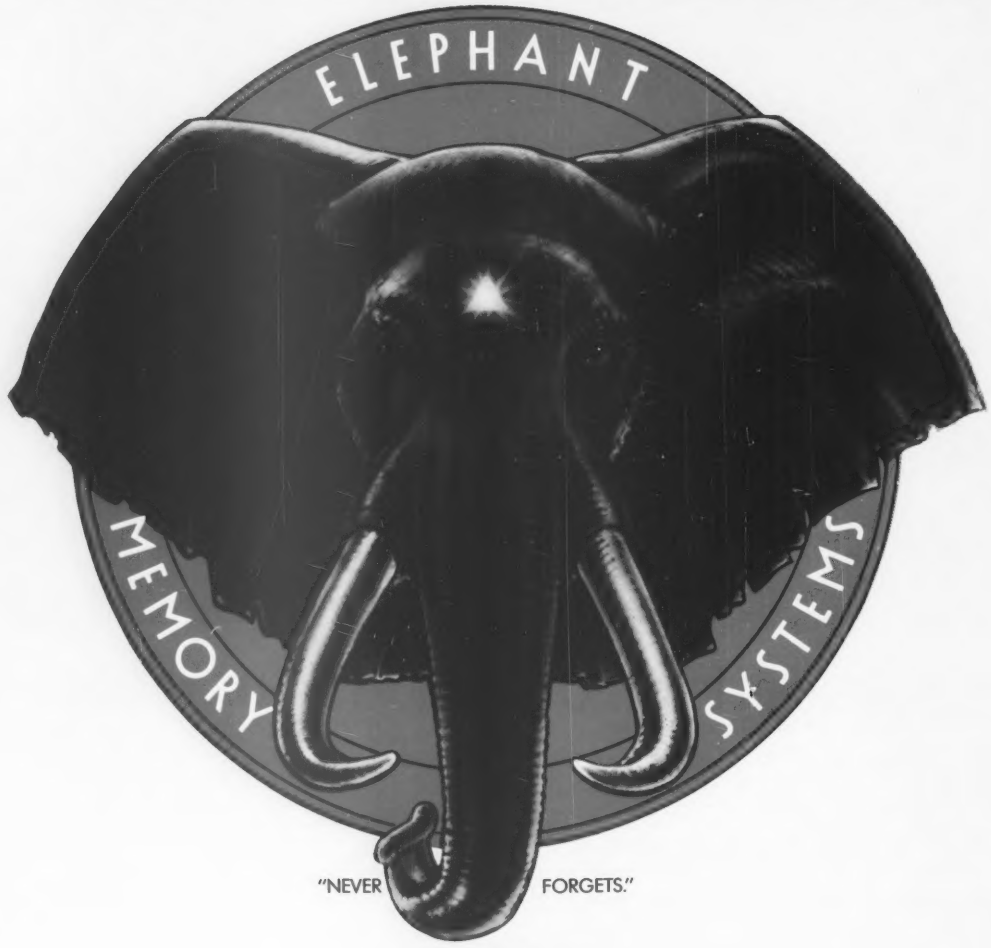

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